THE

ELECTRICAL REVIEW.

VOL. LXXV. SEPTEMBER 18, 1914. No. 1,921.

ELECTRICAL REVIEW.

Vol. LXXV.] CONTENTS: September 18, 1914. [No. 1,921.

	Page
Patriotism or Prejudice?	385
Lead	386
Task Setting and Efficiency	387
Suspension of Creditors' Remedies	387
Correspondence—	
Strange Behaviour of a Motor	388
Arc Lamp Globes	388
Arbitrary Action of a Public Authority	388
Carbons	388
New Electrical Devices, Fittings and Plant (*illus.*)	388
Trading with the Enemy	391
War Items	393
Business Notes	398
The Works of Messrs. T. Harding Churton & Co., Ltd., Leeds (*illus.*)	399
A New Cable-Repairing Steamship (*illus.*)	401
Notes	406
City Notes	409
Stocks and Shares	409
Market Quotations	410
The Rating of Bare Copper Conductors, by W. A. Coates	411
Costing, by "Surplus" (*concluded*)	412
A New Electric Tractor (*illus.*)	413
The Faraday Society	414
British Bulbs for Electric Lamps (*illus.*)	415
Legal	415
Foreign and Colonial Tariffs on Electrical Goods	416
New Patents Applied For, 1914	416
Abstracts of Published Specifications	416
Contractors' Column	Advertisement page xviii

THE ELECTRICAL REVIEW.

Published every FRIDAY, Price 4d.

The Oldest Weekly Electrical Paper. *Established 1872.*

TO BE OBTAINED BY ORDER FROM ANY NEWSAGENT IN TOWN OR COUNTRY.

OFFICE:—4, LUDGATE HILL, LONDON, E.C.

Telegraphic Address: "AGEEKAY, LONDON." Code, A B C.

Telephone Nos.: Holborn 933; Central 4425 (Editorial only).

The "Electrical Review" is the recognised medium of the Electrical Trades, and has by far the Largest Circulation of any Electrical Industrial Paper in Great Britain.

Subscription Rates.—Per annum, postage inclusive, in Great Britain, 13s. 6d.; Canada, £1 1s. 8d. ($5.30). To all other countries, £1 10s.

FOREIGN AGENTS:

ADELAIDE: Messrs. Atkinson & Co., Gresham Street.
AUCKLAND, N.Z: Gordon & Gotch, Albert Street; The Mining and Engineering Review, 31A, Strand Arcade, Queen Street.
BERLIN: Asher & Co., Unter den Linden; Speyer & Peters, Unter den Linden 45, N.W. 7.
BRISBANE: Gordon & Gotch, Queen St.
CHRISTCHURCH, N.Z.: Gordon and Gotch, Manchester Street.
DUNEDIN, N.Z.: Gordon & Gotch, Princes Street.
JOHANNESBURG, CAPETOWN, BLOEMFONTEIN, DURBAN, PORT ELIZABETH, &c.: Central News Agency, Ltd.
LAUNCESTON: Gordon & Gotch, Cimitiere Street.
MELBOURNE: The Mining & Engineering Review, 90, William Street; Gordon & Gotch, Queen Street.
MILAN: Fratelli Treves.
NEW YORK: D. Van Nostrand, 25, Park Place.
PARIS: Boyveau & Chevillet, 22, Rue de la Banque.
PERTH, W.A.: Gordon & Gotch, William Street.
ROME: Loescher & Co., Corso Umberto 1° 307.
SYDNEY: The Mining & Engineering Review, 273, George Street; Gordon and Gotch, Pitt Street.
TORONTO, ONT.: Wm. Dawson & Sons, Ltd., Manning Chambers; Gordon and Gotch, 132, Bay Street.
WELLINGTON, N.Z. Gordon & Gotch, Cuba Street.

Chquees and Postal Orders (on Chief Office, London) to be made payable to THE ELECTRICAL REVIEW, and crossed "London City and Midland Bank, Newgate Street Branch."

THE UNIVERSAL ELECTRICAL DIRECTORY

(J. A. Berly's).

1914 EDITION

H. ALABASTER, GATEHOUSE & CO.,

4, Ludgate Hill, London, E.C.

PATRIOTISM OR PREJUDICE?

IN view of the anxiety that legitimately possesses the minds of so many traders lest they should be guilty of trading with alien enemies, we publish elsewhere the terms of the King's Proclamation, issued last week in supersession of previous announcements on the same subject. We also print extracts from the new Bill imposing penalties upon those who fail to obey the Proclamation, and the remarks made by the Attorney-General when the Bill was before the House of Commons. The provisions should be very carefully studied, and we have no doubt that they will be. It has, of course, been impossible to cover in detail all the points likely to arise, and recognising this difficulty, the Government has appointed a Trading with the Enemy Committee; queries respecting doubtful points should be addressed to the secretary of that committee at the Treasury. With the assistance that it may be possible to obtain from that authoritative source, and with the Somerset House files relating to companies and their shareholders and shareholdings available for inspection, traders should be able to ascertain what is the correct course for them to pursue in particular cases as they arise.

It is incumbent upon everybody, both for his own protection and in the best interests of British trade expansion, to refrain from doing anything which shall in any way benefit the nations with which we are at war, and we have every sympathy with those who are asking questions due to a genuine state of perplexity. With the best intentions in the world, no doubt, hundreds of people are asking whether so-and-so is an alien enemy under the new Trading Rules. But there are others who, we fear, are influenced more by a desire for an answer in the affirmative than by an anxiety lest they should transgress the law. We have ourselves received innumerable inquiries, most of which we have answered to the best of our ability, in the hope of assisting those appearing to us to be in a difficulty and genuinely in search of information. But we are not an evening newspaper, and we have no desire to flounder in the mire. There are too many who are showing themselves adepts at mud-throwing, whether with or without just cause, and seeing that public sources of information are available, we have no wish to make the ELECTRICAL REVIEW the vehicle for the conveyance of questions and reflections which are not made in a proper spirit and are best dealt with in other ways. By telephone message (anonymously), by post (anonymously), we have been favoured with multifarious items of information often in the form of inquiries. Some of the information that we are asked to furnish, we do not possess, nor have we facilities for obtaining it. We may have our own opinions concerning particular individuals or companies, but no reasonable firm will expect us, even from our coign of vantage, to utter publicly all our thoughts regarding such. Those who appear to regard us as a detective agency because we are editors, might be advised to remember that we may have "heard things" about others as well as about those concerning whom they ask questions or make suggestions. We suppose there is nobody who is called upon to "hear things," whether they be about individuals or about associations, so much as the editors of such a publication as this. The suggestions that have been made to us at different times would, for their sheer absurdity, be amusing enough in a London Electrical Charivari, but we are generally regarded as a serious technical and trade journal, and we prefer to spend our days in the matter-of-fact production of serviceable information rather than in making apologies for correspondents' indiscretions committed as the result of incomplete knowledge or information, or in whiling away hours at

the Law Courts. The latter we have done time and time again when it has been in the interests of the electrical industry, but we are not inclined to repeat the process unless it is for some good purpose, at any rate some better purpose than the mere circulation of gossip calculated to damage somebody's reputation or other interests.

Frequently a good deal depends upon the inquirer or the critic. He may be a former employé, or even a trade rival, adopting the shield of anonymity behind which to hide in safety the while he makes insidious insinuations and reflections. Generally speaking, we have no great objection to anonymity, as we have seen that much valuable information obtains currency in that way that would never see the light without it; what we do object to is its abuse. When it is carried the length that it has been of late, we are obliged to write in this way. We give one experience. A telephone caller who declined to give his name informed us that a certain gentleman was a German—"his name used to be so-and-so." We knew that our informant was mistaken, and that the gentleman named was unquestionably an Englishman, and we corrected his information. We believe that he left the instrument a wiser, and, perhaps, a sadder man, having found that not every member of the Institution of Electrical Engineers knows all that is to be known about electrical men in London. We cite this experience, because we believe it to be typical of many statements based on incomplete information that are gaining currency just now. A second example of this sort of thing reached us early in the present week. A correspondent, evidently anxious to know the truth, informed us that his opinion regarding a certain company would have to be materially altered if something that he had read in a certain newspaper was correct. By the same post we received a detailed statement concerning the company mentioned, which showed that there was not the slightest foundation for the statement. The explanation appears on another page to-day, and we were able to set our correspondent's mind at rest promptly by post. Editors who have, as the result of long experience, been impressed with the desirability of making sure of facts before publication, do not see their way to allow themselves the very free licence that is used by some campaigning newspaper writers, and even by some of their own correspondents.

We publish in our "War Items" a further batch of letters relating to the proposed attack upon German capital in British electrical industry, but we think that in view of the fact that the Government has made it clear that it desires such concerns to be regarded as British businesses, it would be more profitable to devote attention to the actual measures that should be adopted for preventing future British electrical orders being placed in Germany or Austria, and for securing for British factories a greatly increased share of Germany's export trade. We venture to make a couple of suggestions. Following upon the views expressed in our leading article of last week, we propose that there be an effort made by some representative British electrical engineering or trading organisation to get into touch with leading representative electrical authorities of a like kind in France, Belgium and Russia with the object of sounding them as to the chances of our increasing our business connections with their countries. Though the war still rages, such steps should be taken at once. There will be a new co-operative spirit between all of the Allies, and we do not think that our attentions will be regarded with suspicion, for in the prevailing temper all of us together will be out to do as far as we can without Germany and German manufactures. We throw out the suggestion for what it may be worth. Our other proposition is that there be a combined effort on the part of British electrical manufacturers, large and small, past buyers of German electrical goods, including, of course, specialised lines, and, if necessary, financial authorities too, with the object of definitely proceeding to prepare ourselves for dealing with the classes of machinery, apparatus, and supplies for which we have too long placed too great a dependence upon German and Austrian works.

In our opinion, to direct our thought and action along such lines as these, and to deal in a thorough manner with the new trading possibilities that will open out for us as soon as hostilities are at an end, is likely to be more profitable for British industry than some other methods which are finding favour here and there at the present. Let us try to be ready, so that the opportunity does not slip through our fingers while we take isolated action and prepare belated schemes.

The British Commercial Attaché at Frankfort (Sir F. Oppenheimer), just before the war broke out, reported to the Board of Trade upon the combined nursing effort which was in progress among German manufacturers, merchants and shippers who had formed themselves into societies for dealing with trade in foreign markets. Everywhere there was a strong movement in support of the effort; the Government was assisting, and the various societies had formed themselves into a union for the interchange of experiences. Military error has, however, deferred German commercial expansion; while some time-tables have gone wrong, the trade time-piece has not only stopped, but the hands have been put back. But there need be nothing to hinder success attending an immediate effort for British combined electrical nursing along the lines suggested above.

Lead.

There has not been a great deal of alteration in the position of the lead market during the past couple of weeks or so. The main feature has been the steady buying of metal on account of the needs of the British and allied Governments, these absorbing a good many thousand tons, while the requirements of the ordinary rollers, &c., are on a limited scale, and it is possibly significant that the past week has seen a slackening in specifications from the general consuming trades.

There has been a good deal of lead coming in available for disposal. This is shown by the fact that the agents for the Convention declared all their September lead on the first day of the month, when the premium on near deliveries practically disappeared, which bears silent testimony to the material relaxation of pressure which has been set up.

Production at all the main sources of supply has been much reduced. In Australia, for instance, there is a practical suspension of operations in the Broken Hill field, and a very similar state of things exists in Spain. The position of lead is, indeed, a very curious one. The output of the Broken Hill mines, which is won by British labour and capital, is handled by German houses practically exclusively, and it is felt that the time has now come when we as a nation can no longer allow our national resources to be exploited by the Germans. Hence it may be taken for granted that the end of the war will see a radical alteration in many industrial connections so far as the metal trade is concerned. It is most probable, for instance, that there will be increased smelting facilities provided for the Australian production, and that the world's lead trade can continue to be indefinitely controlled by the German Convention, which for years has had it in the hollow of its hand, is unthinkable. Hence the indications are pointing very clearly to an entire alteration in the position.

For the present there is an ample supply of metal available, and the imports into the country for the first eight months of the year show an increase over 1913, amounting, as they do, to 147,145 tons, compared with 136,704 tons in 1913, the August arrivals being 19,287 tons, against 17,189 tons last year. There may be a reduction in the arrivals coming forward later in the year, owing to the interference with output already commented upon, but it must not be forgotten that, meantime, all the lead available from Spain and Australia is coming to the United Kingdom, and that a good deal of this is lead which has been diverted here, and which, had not war broken out, would have gone to Germany. There is an all-sufficient supply on the market now, and as trade generally is poor, there need be no apprehension as to there being any scarcity. The easiness of the market, indeed, should be regarded as being assured. There have been some good orders placed for Russia; considerable quantities have been shipped to Archangel, and more is to follow. America has adopted an entirely passive policy, and nothing has been heard of offers from across the Atlantic for some weeks now. At round present prices there is not the least chance of America being a seller. According to returns just to hand, the stocks of bonded lead in the U.S. on June 30th were 6,461 tons, against 5,956 tons on May 31st, and 7,707 tons a year ago.

Task Setting and Efficiency.

All the United States is apparently bitten with the magic of efficiency—no bad thing in its way, but one which in America calls to its aid a sort of universal cant of writers who bow down before the Juggernaut of Taylorism as though it were some deity or devildom to be feared.

In the *Transactions* of the American Society of Mechanical Engineers we have been told how one Walter A. Polakov reorganised a power plant along successful lines to such good purpose as to lead him to write a paper thereon. Mr. Polakov does at least start on a good basis. He has as datum so much steam to produce, and if he can keep this steam flowing with less coal than before, each fireman will be doing less physical work in stoking. But, to reduce this physical work of foot-pounds, he has to do much other work by way of observing gauges and apparatus, listening for the tinkling of a bell, and acting on its behests, so that, after all, may he not be more fatigued? Mr. Polakov rightly says that the opposition of labour organisations in some instances where greater efficiency is demanded of working men, without a lequate safeguards to their vitality and ability to work, is a just and well-grounded fight against the short-sightedness of some self-termed efficiency-experts. This dictum of Mr. Polakov is what thinking men have to say against Taylorism as a workshop religion. In this country the reverse has happened, at least, in the skilled trades.

In America things have gone to the opposite extreme especially where, unlike the case of the boiler house, there is no datum line. Better efficiency in a power house means, *primâ facie*, less manual work, unless it be followed by staff reduction. It is doubtless very difficult to reduce the coal, fired by six men, by one-fifth, and not feel that at least one man may go. The very reduction by one-tenth of the work may have so eased the men that they increased the tenth to a fifth; and to cut out one man might rub out the saving. It would certainly upset the men, f r men have always been upset by the almost inevitable decisions of piecework procedure. The author's studies are too long and involved to admit of their being reproduced. Suffice it to say that they were based on a series of tests made to determine the conditions of best efficiency, and as a result, a 70 per cent. heat efficiency was fixed upon as a task that could be demanded, the desired result being obtained by such an attention to the maintenance of fire conditions, regularity of firing, and so on, that a minimum of air was used in the furnaces. The task does not certainly appear very high, and, as a fact, it was exceeded in the attainment as a permanency of 73·1 per cent. for boilers which, when specially tested, gave as much as 76 per cent. on 89·6 per cent. load and 77·66 on a load of 115·5 per cent. of the rating. The permanent level of 73·1 per cent. represented a saving of 25 per cent. of the fuel bill without any capital expenditure beyond that necessary for a few extra instruments.

The firemen's pay amounted to 10 to 15 per cent. of the coal bill, so that in saving 25 per cent. of the coal bill, there was evidently a good sum available for a bonus to the men. If a power station can be fired for a tenth or a seventh of the coal bill, it would be interesting to have some genuine information as to the comparison between a hand-fired station on one hand, and the same machine-fired, including capital charges on the machines. So large a station on this side of the Atlantic would probably be machine-fired.

Incidentally, the studies indicated that a man working 12-hour shifts was 4·5 per cent. less efficient than the man working eight-hour shifts. If the 4·5 per cent. is the difference in the fuel efficiency, it would hardly appear to warrant the eight-hour shift, which would cost 5 to 7½ per cent. of the coal cost if the wages per shift remained the same. But, anyhow, 12 hours is too long for a shift. It is only fair to say that the author puts forward his views with every consideration for humanity in his words, in spite of our prejudice.

SUSPENSION OF CREDITORS' REMEDIES.

[FROM OUR LEGAL CONTRIBUTOR.]

Creditors who imagine that upon the abolition of the Moratorium, their difficulties will be at an end, are doomed to disappointment. In our issue of September 11th we drew attention to the fact that writs will be numerous as soon as the time mentioned in the proclamation which postpones payment of debts comes to an end; but an Act which was passed on August 31st may do much to render the issue of a writ of little avail in order to secure the payment of a sum due. Nay, more, the measure in question may even have effect to prevent security being enforced.

The Act is termed the Courts (Emergency Powers) Act, 1914. It provides that after August 31st no one may proceed to execution on, or otherwise to the enforcement of, any judgment or order of any Court (whether entered or made before or after the passing of the Act) for the payment or recovery of a sum of money to which the Act applies, *except by leave of the Court.*

The Act applies, practically speaking, to all debts due under contracts made prior to August 4th, 1914. The only exception is rent due under a lease where the rent does not exceed £50 per annum. Such rent cannot be recovered except in accordance with the provisions of this Act whether the lease is entered into before or since August 4th, 1914.

The powers of the Court are thus defined. If a creditor applies for leave to enforce a judgment, and the Court is of opinion that time should be given to the person liable to make the payment on the ground that he is unable to make the payment immediately by reason of circumstances attributable directly or indirectly to the present war, the Court may, in its absolute discretion, after considering all the circumstances of the case, and the position of all the parties, by order, stay execution or defer the operation of all such remedies as aforesaid (as to which see *infra*) for such time and subject to such conditions as the Court thinks fit.

The following are a few examples of the kind of payments, the discharge of which may be suspended by the Court under the powers above mentioned:

(*a*) The price of goods or machinery sold and delivered under an agreement or contract made prior to August 4th;

(*b*) Rent due under a lease made prior to August 4th;

(*c*) Instalments due on the hire of machinery.

The operation of the Act is not, however, confined to judgments. The other remedies which are sometimes open to creditors are also suspended. Thus, unless leave be obtained, no person may levy any distress, take, resume, or enter into possession of any property, exercise any right of re-entry, foreclose, realise any security, forfeit any deposit or enforce the lapse of an insurance policy for the purpose of enforcing the payment or recovery of a sum of money or in default of the payment of any sum of money.

By virtue of the powers thus conferred upon the Court the prudent creditor may be deprived of the advantages which he thought his care and foresight had secured to him. He may not:—

(*a*) Distrain for rent due;

(*b*) Recover possession of premises for non-payment of rent;

(*c*) Sell a security which he has taken to secure the repayment of an advance;

(*d*) Forfeit any deposit, *e.g.*, the deposit paid on entering into a contract for the sale of land, or the deposit paid by a consumer of electricity;

if the Court is of opinion that the default of the debtor is due to the war. There is some doubt in the writer's mind whether a surety could be called upon to make good the default of his principal, except by leave of the Court.

Finally, the new Act takes away from the creditor his most potent weapon for compelling payment of money justly due. In the piping times of peace, your judgment debtor can often be made bankrupt if he does not comply with the order of the Court. The mere suggestion of "bankruptcy"—which generally involves commercial disgrace—is anathema to the ordinary man. Now, however, a debtor threatened with bankruptcy proceedings can plead the war, and if he pleads it successfully he may so escape a receiving order.

The rules under which the new Act is to be administered have not yet been drafted. Until we have an opportunity of seeing them, it will be impossible to say upon what principles the Court will be allowed to act in granting relief. We can only hope that in exercising their new functions, the Courts will have due regard to the rights of creditors, and that by insisting upon strict proof that misfortune is due to the war, the designs of a debtor who can, but will not, pay may be frustrated.

CORRESPONDENCE.

Letters received by us after 5 P.M. ON TUESDAY cannot appear until the following week. Correspondents should forward their communications at the earliest possible moment. No letter can be published unless we have the writer's name and address in our possession.

Strange Behaviour of a Motor.

The motor is a 220-volt D.C. four-pole machine, and is connected on to the mains in the ordinary way with starter and main switch, &c. This motor had been running for a short time when a slight repair became necessary. This repair, I may state, was not electrical.

No connections had been altered, but on running up again we found that it ran up in the *reverse direction* and with *no field*. We tested the starter, switches, &c., and connections, and they were all O.K., but we found a brush pillar had gone to "earth." On insulating it and running up, the motor ran in the right direction and with a field. It is a shunt motor, and connected just the same as any other shunt motor. There is a "dead earth" on our system, but I do not know on which side the "earth" was on the motor.

The only possible explanation I can find as regards the reverse running is that in a motor the brushes lag behind the neutral point, and so supposing there is no field it would tend to run in the opposite direction, whereas if the brushes were leading in any case the motor, with or without field, would run in the proper direction. But we cannot account for the loss of the field, which was easily apparent by excessive speed and sparking greatly.

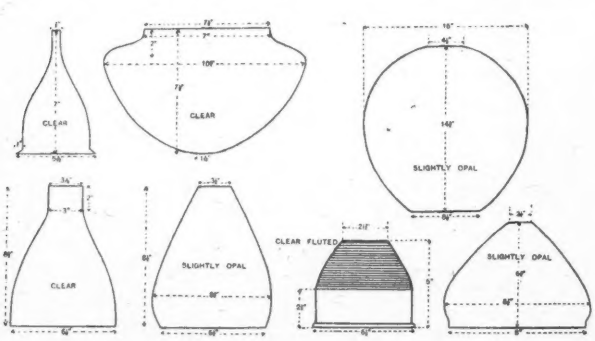
We should be greatly obliged if any of your correspondents could put us on the right track.

A. F. Crauford.

Croydon, *September 11th*, 1914.

Arc Lamp Globes.

I enclose you drawings of the different arc lamp globes used in this borough, and I shall esteem it a favour if you will insert same in your paper, so that other corporations



and municipalities of the British Isles who use similar globes can get into communication with myself, with a view to arriving at the approximate quantity used per annum.

This information would greatly assist British firms in a position to manufacture, who will no doubt get into touch with us on seeing this article.

Sydney W. Baynes,
Chief Electrical Engineer.

St. Pancras Electricity Department,
London, N.W., *September 11th*, 1914.

Arbitrary Action of a Public Authority.

In view of the present wave of patriotism, the following incident, which occurred a month or two ago, is interesting. A certain public body invited tenders for some plant, and issued General Conditions which were grossly unfair—engineer sole arbitrator, and similar clauses. The makers in a body refused to agree to the conditions, and the purchasers then said they would obtain the material abroad. Will Mr. Purse, or some other champion of the right of purchasers to dictate their own terms, arise in his might and show that the action referred to was correct?

Incidentally, it may be mentioned that it is (and was then) almost, or quite, impossible to obtain the apparatus in question abroad, and the purchasers said that if they could not buy it from some other country, they would adopt a different method of working. Evidently, therefore, they were not only willing to spend money abroad—and pay more, as English plant would certainly have been cheaper—but were also ready to waste public money by utilising a less efficient scheme rather than agree to Conditions of Contract which the I.E.E. consider fair.

Advocate of Patriotism in Time of Peace.

Carbons.

On page 374 of this week's issue under the heading "Late Correspondence," "Inquirer" addresses two questions to me, which I am authorised by my board to answer, either if you think it to be of use to the industry, or if "Inquirer" will make his name public in your columns, instead of hiding himself behind a *nom de plume*.

General Electric Co., Ltd.,
K. ALWOOD, *Secretary.*

London, *September 11th*, 1914.

NEW ELECTRICAL DEVICES, FITTINGS AND PLANT.

Electric Hand Lamp.

MESSRS. WARD & GOLDSTONE, of Sampson Works, Salford, have recently brought out a new electric hand lamp arranged on a novel system, for which they have obtained provisional protection. They inform us that whereas a dry battery will only light a bulb consuming a certain current for a fixed number of hours, if the current be reduced to one-half, there is an enormous increase in the output; they, therefore, use two refills in parallel for a lamp which in the ordinary way would be supplied with one. The result, we understand, is that whilst one refill would keep the lamp burning for only four or five hours, the two (connected in parallel in the particular way that they have devised) will keep it

FIG. 1.—THE "MULTIFIL" ELECTRIC HAND LAMP.

going for no less than 34 hours. The refills are of the ordinary standard pocket lamp size, which can be obtained anywhere. Burning the lamp one hour daily on this method, 40 hours' light has been obtained. The hand lamp is light and compact, and entirely British made. The act of switching-on puts the refills in parallel, and in connection with the lamp, but when the light is turned off, the cells are also disconnected from one another, so that no discharge can take place between them.

The results claimed by the makers are certainly startling, the effective life of the cells being more than trebled.

The B.T.H. Magneto.

In view of the fact that the manufacture of ignition magnetos, as we recently pointed out, has hitherto been practically a German monopoly, we learn with great pleasure that a new magneto of British manufacture will shortly be placed on the market in quantities, by the British Thomson-Houston Co., Ltd., of Rugby. The B.T.H. magneto is manufactured at the Coventry works of the company, and is the result of over a year's systematic experimenting, both in laboratories and in actual practice on the road and elsewhere. We are informed that it has demonstrated its ability to withstand the severest service conditions. In designing and building this magneto, the company has brought its wide electrical experience to bear upon the subject, and has followed, with the greatest care, the accepted line of magneto manufacture and practice, so that the B.T.H. magneto is interchangeable with the standard make of magneto, and will give equally satisfactory, if not superior, results.

No branch of engineering manufacture requires more accurate work than the production of magnetos, and in view of the fact that the company is one of the largest British manufacturers of electrical apparatus and has been engaged for many years in constructing electrical machines in which the highest grade of workmanship is essential, it is in an exceptionally favourable position to manufacture and supply reliable magnetos. The machining of the magneto is on a very high level of accuracy, the fits of the majority of parts being absolute, and where limits are allowed they are reduced to less than a thousandth of an inch. This high level of accuracy is obtained by the use of special jigs and limit gauges, over 3,000 of which are required.

Like most modern magnetos, the B.T.H. has a base and end plates of aluminium, and is totally enclosed and weatherproof There is a fine gauze protection cover over a small opening in the top of the magneto, which enables air to reach the armature so as to dissipate any vapours which may be formed. The magnets are made longer than is usual, this resulting in a more permanent magnet, and a hotter spark at low speeds; they are manufactured from a special grade of tungsten steel possessing great retentivity.

The armature is neat and compact, the condenser being contained in a brass cap at one end of the core; its dielectric consists solely of pure mica sheets. The armature shaft is mounted on ball bearings, and the greatest care has been exercised to ensure good lubrication, while at the same time totally excluding oil from the windings. The coils, after they are wound, are impregnated with a filling material which cannot subsequently soften. The coils are also covered with a heavy jacket of suitable insulating material, which by subsequent treatment is converted into a homogeneous waterproof unit. As an additional safeguard for the armature insulation, a safety spark gap is provided, which, in the event of the voltage rising to an abnormal value, acts as a safety valve to prevent breakdown of the insulation.

Fig. 2 is a side view of the B.T.H. magneto for small four-cylinder cars. The contact maker is shown in fig. 3, and is easily accessible and detachable. The contact points have been given special attention to ensure long life. Fig. 3 also gives a good view of the rotating and stationary portions of the distributor. Fig. 4 shows an exploded view of the B.T.H. motor-cycle magneto, from which the construction of the parts can easily be seen. The high-tension slip-ring is on the left side of the armature, and the condenser on the right. The end cover on the extreme right of the illustration shows the arrangement of the high-tension terminal, which is absolutely waterproof, as it contains a metal socket, but no hole through into the interior, and the spark gap.

B.T.H. magnetos are at present available in three sizes: a small size suitable for single-cylinder motor-cycles, and two larger sizes intended for use on four-cylinder cars. Other sizes are in course of development.

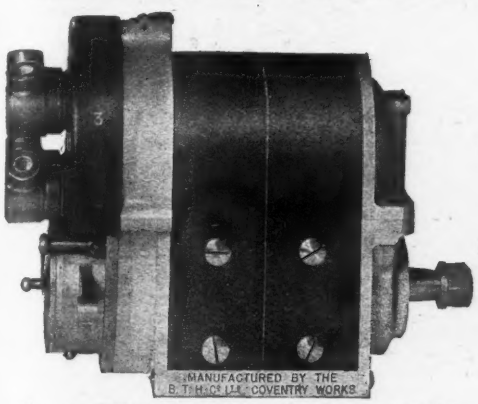


Fig. 2.—B.T.H. Magneto for Four-cylinder Car.

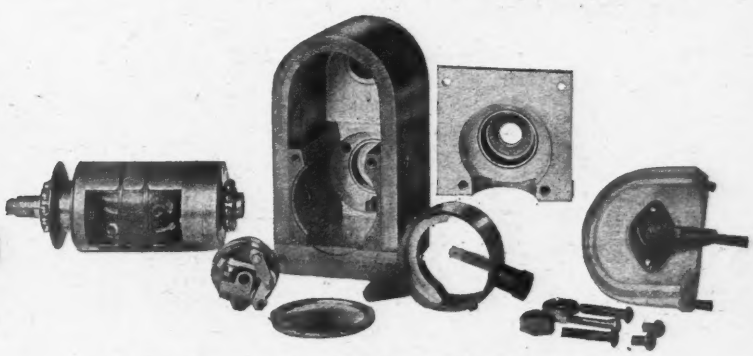


Fig. 4.—Exploded View of B.T.H. Motor-cycle Magneto

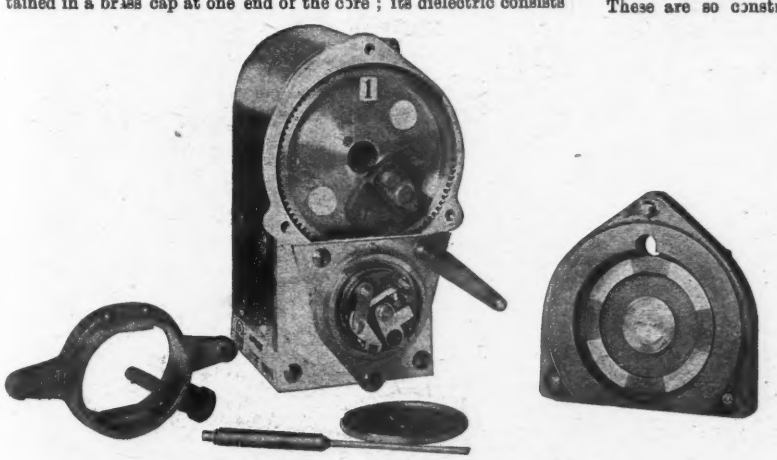


Fig. 3.—B.T.H. Magneto with Covers of Distributor and Contact-maker Removed.

New Lamp Lock.

Messrs. C. G. M. Bennett and C. H. Jeffcoat, of 18, Ranelagh Gardens, Hammersmith, W., trading as "Lamlok Specialities," have recently obtained provisional protection for a complete new locking lampholder. They take advantage of the groove in the side of the porcelain; a socket is provided on the dome of the lampholder, over one of the grooves, into which is inserted a steel screwed pin; the pin passes down the groove, and when screwed home, bears on the edge of the brass ferrule of the lamp, rendering it impossible to remove the latter from the bayonet socket. The lamp is released by unscrewing the pin with a special key, and the pin is so designed that it cannot be moved without the key, nor can it even be seen without difficulty. The inventors are in negotiation with leading firms of lampholder makers with a view to the manufacture of the holders in quantity. Persons interested in the matter should communicate with Mr. Jeffcoat, at the above address.

New Hand-Lamps.

Two new patterns of hand-lamps complying with the Home Office Regulations have recently been introduced by Messrs. Simplex Conduits, Ltd., of 116, Charing Cross Road, W.C. These are so constructed that neither the wire guard nor the brass clamping ring can become charged, and as the lampholder and lamp cap are surrounded with a sheath of insulating material, there is no need to earth the hand-lamp. The flexible cord is securely gripped at the top and bottom of the wooden handle, to which a leather loop is attached. We illustrate one of the new types; the other is provided with a more substantial iron guard.

Fig. 5.—New Simplex Hand-Lamp.

Electrically-Driven Hoists for Wharf Use.

We illustrate in fig. 6, p. 390, an electric friction hoist installed at the Odessa Wharf, Rotherhithe, and driven by an 8-H.P. 480-volt, 800-R.P.M. Vickers motor. The motor, which is protected by guards

C

from mechanical injury, is of the totally-enclosed type, shunt wound, with continuous rating for a direct-current supply. The starting gear, which could not be included in the view, consists of a Vickers standard panel, with double-pole switch and fuses, and double automatic totally-enclosed starter.

This hoist is installed at the riverside, and is used for unloading paper from the ships' holds. There is a similarly equipped hoist at the opposite end of the warehouse, which is used for lowering the bales into lorries for distribution by road.

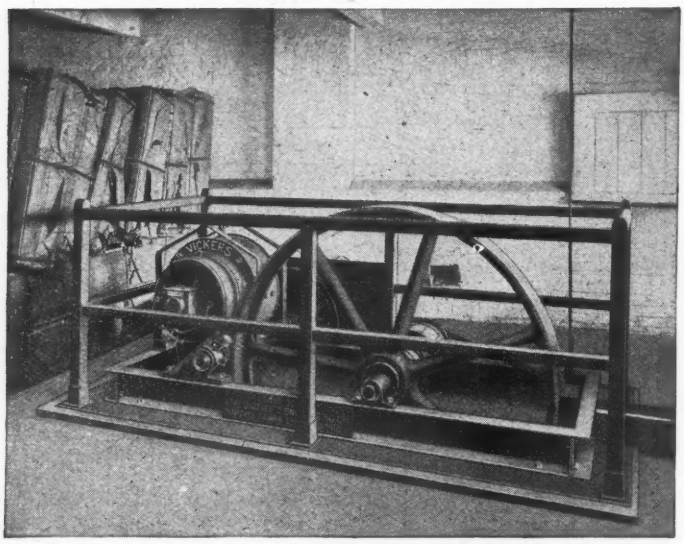


Fig. 6.—Friction Hoist with Vickers Motor Drive.

The hoist, operated by the vertical rope, is of the friction type, and capable of carrying a load of 1 ton. The rope controls the hoist by lifting the lever and balance weight to which it is attached. Ordinarily the large wheel which is attached to the winding drum rests against a brake block, but when the rope is pulled the lever acts on an eccentric in which the bearings are mounted, and so lifts the wheel more or less free from the brake block and allows the weight to descend.

A further movement of the rope brings the wheel against the friction pinion on the opposite side which is geared to the motor, which runs continuously in one direction, and this effects the hoisting.

Quite a number of these friction hoists, operated and controlled by Vickers motors and switchgear, are in daily use for wharf and similar work.

The Chatteris Engineering Works Co., of Old Broad Street, E.C., are the makers of the hoisting apparatus, and were also the contractors for the installation and wiring work in connection with the Odessa Wharf equipment.

Hollow Bars.

Messrs. Dunford & Elliott (Sheffield), Ltd., of Attercliffe Wharf, Sheffield, have introduced square, round and other section steel bars with a central small round hole from end to end, in sizes from ⅛ in. to 3 in. in diameter. These bars have a number of useful applications in engineering work, as for shafting with internal forced lubrication, stay bolts, &c.

Bell-pushes and Connections.

One of the simplest and commonest electrical appliances is the ordinary bell-push; considering its primitive construction, it is remarkable how well this little thing does its work. But the design is obviously open to criticism on various grounds, and the "Pixy" patent push movement made by Messrs. A. P. Lundberg and Sons, of 477-489, Liverpool Road, N., is designed on sound scientific lines as a high-class substitute for its elementary prototype. From the section, fig. 7, it will be seen that a smooth and rectilinear movement of the plunger is ensured by a split guide pin, which also makes rubbing contact with a close-fitting tubular terminal, while a second pin and terminal carry platinum contacts; two shorter pins serve as guides to two steel springs, and the terminals are effectively shielded from one another. The device can be wired without separating the body from the barrel, which is provided with a flange for fixing to the support, one type of which is shown in fig. 8. The brass cover is screwed on like that of a tumbler switch, and a great variety of patterns and finishes is available. Flush patterns with wood, brass or porcelain fronts are also made. Fig. 9 shows a "Pixy" push combined with a plug-connection for an extension push or a house telephone, and fig. 10 a carpet plug-connection, which is sewn into the carpet, the leads being run under the carpet to a second plug-connection on the skirting-board; this device enables a bell, telephone, &c., to be connected up at any point on the floor, without cutting into the latter, while allowing the carpet to be removed when desired. Many other pushes, keys, &c., are made by Messrs. Lundberg.

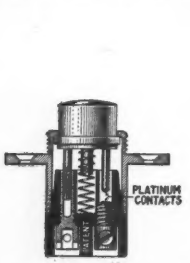


Fig. 7.—Section of "Pixy" Push Movement.

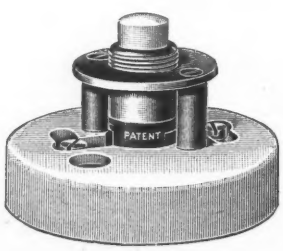


Fig. 8.—"Pixy" Switchbase Push.

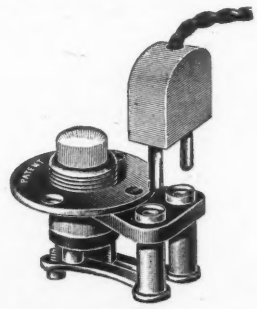


Fig. 9.—Push and Plug-connection Combined.

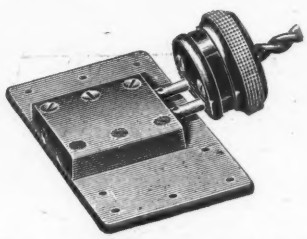


Fig. 10.—Carpet Plug-connection.

The N.P. Pump Bucket.

We have received particulars of the new one-ring design of the patent bucket of the N.P. Pump Bucket Co., of 11, Queen Victoria Street, E.C., which can be used where their standard two-ring design is inapplicable. The ring is of a special composition, and is not split; by means of ports which admit water under pressure behind the ring, the fit is maintained and leakage reduced to the minimum.

Miniature Electric Letter Signs.

An extremely clever device has been shown to us by Mr. F. B. Converse, of 117, Oxford Street, W., manager of the company bearing the above title. It consists of tubular glass letters, as shown in fig. 11, each of which constitutes in itself an electric lamp, being provided with a series of tiny carbon filaments connected in series. The back of the letter is covered with a white composition, so that in daylight the sign consists of white letters, and when switched on each letter shines out brilliantly. Although the number of filaments varies according to the shape of the letter, each letter takes exactly 11 watts; the letters are mounted on porcelain base blocks provided at one end with spring contacts and at the other with sockets to receive the contacts of the next lamp, so that when the blocks are slid into a trough-shaped frame, as in

Fig. 11.—Miniature Lamp Letter.

fig. 12, the whole of the connections are automatically made, the lamps burning in parallel on a circuit of 110 volts. Thus any combination of letters to form words can be quickly and easily made. If two groups of letters or words, each comprising about the same number of letters are used, they can be connected in series on 220 volts; otherwise a resistance, such as a glow lamp, can be

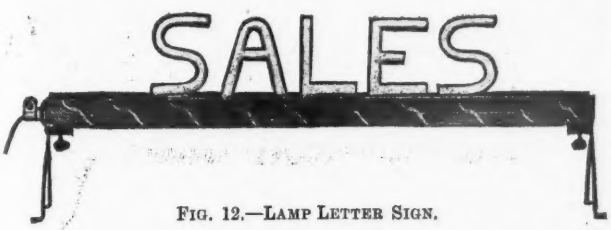


Fig. 12.—Lamp Letter Sign.

inserted in series with them for the higher voltages. The frame can be modified in various ways, to stand on a table, to be fastened to the wall, or to form a hanging frame. The device is intended for indoor use, and is strikingly effective. Letters, numbers and various special characters are made with a maximum height of 3½ in.

New Interphones.

The Sterling Telephone and Electric Co., Ltd., of 210-212, Tottenham Court Road, W., have recently effected some noteworthy improvements in their "Era" automatic interphones. The chief of these is the production of standard strips of levers, rigidly mounted on iron plates, as illustrated in figs. 13 and 14 herewith.

Fig. 13.—New Era Automatic Interphone.

The strips are standardised in five, eight and ten levers each, and are of handsome appearance and excellent workmanship; the parts are simple and robust, and the design leaves little to be desired from a mechanical as well as an electrical point of view. Selecting and ringing are accomplished in one operation by pulling

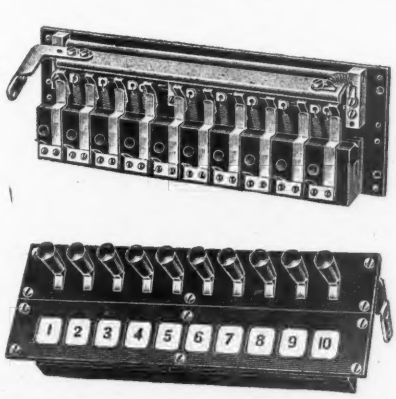


Fig. 14.—Standard Strip of Levers, Front and Rear Views.

a lever over as far as it will travel, to ring, and releasing it, when it remains locked in position for speaking. At the conclusion of the conversation the replacement of the hand-combination on the cradle automatically restores the lever to its normal position. Besides the wall pattern illustrated, a table pattern is made.

TRADING WITH THE ENEMY.

We print below the "Trading with the Enemy" Proclamation No. 2, which was issued on September 9th, and which is in substitution for the previous announcements on the same subject:—

1. The expression "enemy country" in this Proclamation means the territories of the German Empire and of the Dual Monarchy of Austria-Hungary, together with all the colonies and dependencies thereof.

2. The expression "enemy" in this Proclamation means any person or body of persons of whatever nationality resident or carrying on business in the enemy country, but does not include persons of enemy nationality who are neither resident nor carrying on business in the enemy country. In the case of incorporated bodies, enemy character attaches only to those incorporated in an enemy country.

3. The expression "outbreak of war" in this Proclamation means 11 p.m. on the 4th August, 1914, in relation to the German Empire, its colonies and dependencies, and midnight on the 12th August, 1914, in relation to Austria-Hungary, its colonies and dependencies.

4. From and after the date of this Proclamation the following prohibitions shall have effect (save so far as licences may be issued as hereinafter provided), and We do hereby accordingly warn all persons resident, carrying on business or being in Our Dominions—

(1) Not to pay any sum of money to or for the benefit of an enemy.

(2) Not to compromise or give security for the payment of any debt or other sum of money with or for the benefit of an enemy.

(3) Not to act on behalf of an enemy in drawing, accepting, paying, presenting for acceptance or payment, negotiating or otherwise dealing with any negotiable instrument.

(4) Not to accept, pay, or otherwise deal with any negotiable instrument which is held by or on behalf of an enemy, provided that this prohibition shall not be deemed to be infringed by any person who has no reasonable ground for believing that the instrument is held by or on behalf of an enemy.

(5) Not to enter into any new transaction, or complete any transaction already entered into with an enemy in any stocks, shares, or other securities.

(6) Not to make or enter into any new marine, life, fire or other policy or contract of insurance with or for the benefit of an enemy; nor to accept, or give effect to, any insurance of, any risk arising under any policy or contract of insurance (including re-insurance) made or entered into with or for the benefit of an enemy before the outbreak of war.

(7) Not directly or indirectly to supply to or for the use or benefit of, or obtain from, an enemy country or an enemy, any goods, wares or merchandise, nor directly or indirectly to supply to or for the use or benefit of, or obtain from any person any goods, wares or merchandise, for or by way of transmission to or from an enemy country or an enemy, nor directly or indirectly to trade in or carry any goods, wares or merchandise destined for or coming from an enemy country or an enemy.

(8) Not to permit any British ship to leave for, enter or communicate with, any port or place in an enemy country.

(9) Not to enter into any commercial, financial or other contract or obligation with or for the benefit of an enemy.

(10) Not to enter into any transactions with an enemy if and when they are prohibited by an Order of Council made and published on the recommendation of a Secretary of State, even though they would otherwise be permitted by law or by this or any other Proclamation.

And We do hereby further warn all persons that whoever in contravention of the law shall commit, aid, or abet any of the aforesaid acts, is guilty of a crime and will be liable to punishment and penalties accordingly.

5. Provided always that where an enemy has a branch locally situated in British, allied, or neutral territory, not being neutral territory in Europe, transactions by or with such branch shall not be treated as transactions by or with an enemy.

6. Nothing in this Proclamation shall be deemed to prohibit payments by or on account of enemies to persons resident, carrying on business or being in Our Dominions, if such payments arise out of transactions entered into before the outbreak of war or otherwise permitted.

7. Nothing in this Proclamation shall be taken to prohibit anything which shall be expressly permitted by Our licence, or by the licence given on Our behalf by a Secretary of State, or the Board of Trade, whether such licences be especially granted to individuals or be announced as applying to classes of persons.

The Trading with the Enemy Bill was introduced and passed its second reading in the House of Commons last week, and questions on the matter were put by several members. This Bill, among other things, provides for heavy penalties by way of imprisonment, or fine, or both, or forfeiting of goods or money in question, for any person trading with the enemy during the war. A person shall be deemed to have traded with the enemy if he has entered into any transaction or done any act which may have been prohibited by or under any Proclamation issued by His Majesty dealing with trading

with the enemy for the time being in force, or which at common law or by statute constitutes an offence of trading with the enemy. The following extracts will be of interest:—

Provided that when it appears to a Secretary of State or the Board of Trade that the case is one of great emergency, and that in the interests of the State immediate action is necessary, a Secretary of State or the Board of Trade may, by written order, give to a person appointed by him or them the like authority as may be given by a warrant of a justice under this sub-section:—

(2) Where it appears to the Board of Trade—

(a) In the case of a firm, that one of the partners in the firm was immediately before or at any time since the commencement of the present war a subject of, or resident or carrying on business in, a State for the time being at war with His Majesty; or

(b) In the case of a company, that more than one-third of the issued share capital or of the directorate of the company immediately before or at any time since the commencement of the present war was held by or consisted of persons who were subjects of or resident or carrying on business in, a State for the time being at war with His Majesty; or

(c) In the case of a firm or company, that the firm or company were acting as agents for any person, firm, or company trading or carrying on business in a State for the time being at war with His Majesty; the Board of Trade may, if they think it expedient for the purpose of satisfying themselves that the firm or company are not trading with the enemy, by written order, give to a person appointed by them, without any warrant from a justice, authority to inspect all books and documents belonging to or under the control of the firm or company, and to require any person able to give information with respect to the business or trade of that firm or company, to give that information.

For the purposes of this sub-section, any person authorised in that behalf by the Board of Trade may inspect the register of members of a company at any time, and any shares in a company for which share warrants to bearer have been issued shall not be reckoned as part of the issued share capital of the company.

(3) If any person having the custody of any book or document which a person is authorised to inspect under this section refuses or wilfully neglects to produce it for inspection, or if any person who is able to give any information which may be required to be given under this section refuses or wilfully neglects when required to give that information, that person shall, on conviction under the Summary Jurisdiction Acts, be liable to imprisonment, with or without hard labour, for a term not exceeding six months, or to a fine not exceeding fifty pounds, or to both such imprisonment and fine.

Where the Board of Trade are satisfied either that an offence under this Act has been or is about to be committed in connection with any business or trade, and that it is in the public interest that the business or trade should continue to be carried on, or that any business or trade which, in the public interest, should continue to be carried on, is in danger of being discontinued owing to difficulties of management connected with the war, the Board of Trade may apply to the High Court for the appointment of a receiver of the trade or business, and the High Court shall have power to appoint such a receiver for such time and subject to such conditions as they think fit; and, subject to any such conditions, when a receiver is so appointed, business or trade may be carried on with and by that firm or company.

In his speech in the Commons the Attorney-General, according the *Times* report, from which we venture to extract freely owing to the importance of the matter, said that the proclamation issued against trading with the enemy was designed primarily as a warning. The question had been raised of the position of companies registered as English but found to be in substance enemy concerns. This Bill did not deal with that case save to the extent that it conferred upon the proper Department of State the power to investigate the books of any such company in order to ascertain the facts. It would be foolish, however, to say that just because some enterprise had Austrian or German connections it should be ostracised. The true method was to make certain that such an enterprise did not transmit goods or profits to the enemy's country. Again, in regard to the payment of dividends to shareholders who were foreigners, we were not engaged in any process of confiscation. It was a matter not only of commercial good faith, but it was good business to make it plain to private citizens that their reasonable commercial interests and vested rights in this country were safe. The question had been raised whether objection would be taken to payments which English merchants or others wished to make in discharge of just debts to agents here of firms in the enemy's territory. He had some doubts whether a man could be said to have any such agency once the war had broken out, but he hoped arrangements might be made to enable such liabilities to be discharged, taking proper security that money or goods would not be transmitted to the hostile country. Some plan by which they might be able to collect such moneys and hold them on account might be found to be the best method. In the Proclamation they were issuing that day they were slightly varying the permission previously given about dealing with branches. So long as the branch was, for example, in China or South America, the advantage accruing to our own trade by allowing ordinary dealings to continue was infinitely greater than any advantage which would accrue from stopping such trade. Of course they could not have any new transactions entered into with the head office in the enemy's country. There was no objection to the entering into transactions with the branch in a neutral territory of a house established in Germany as long as the contract was made with, and the goods were delivered to, the branch and as long as there was no direct contract with the head office in Germany or Austria. But it could not be permitted if the branch was in neutral territory on the Continent of Europe. To allow trade with a branch in some neutral country—say Italy—with borders on the frontiers of the countries with which we were at war would be to supply a very considerable loophole for trading with the enemy. In suitable cases, with proper security, it would still be possible to grant licences, and the effect would be that no offence would be committed under the Proclamation by trading with a branch of a German or Austrian house as long as the branch was out of Europe or in the United Kingdom, where it could be controlled. Although he did not encourage the multiplication of inquiries, they should be addressed to the Secretary of the Trading with the Enemy Committee at the Treasury. They could not allow any new sale or purchase of shares as between persons in Germany or Austro-Hungary and ourselves which would be a new contract, but there would be no objection to writing the new name in the register in the case of contracts already made.

On September 11th the Attorney-General (according to the *Times* report) said that they wanted on the one hand to take every security that was proper and possible to prevent the enemy profiting by transactions carried on here. On the other hand, it was not desirable to take steps which would interfere with British interests, including among these British commerce and employment. He thought this Bill went a long way to give the necessary security. There was a great advantage from some points of view in treating enterprise in this country, even though it had a considerable enemy element in its composition, as British. If it entered into transactions with a foreign country in hostile territory it was committing a crime and subject to the same penalties as purely British firms. Power had been taken to enable the Board of Trade to examine books and documents, as well as for the appointment in proper cases of a receiver or manager, to see that a business was carried on in the proper way. Referring to a question about business profits accruing to enemy shareholders, he said he would be slow to say it would be right to do anything in the nature of confiscation of the private property of subjects of an enemy State. Such a policy would be capable of provoking considerable reprisals.

Commenting on the attacks of the daily Press upon German-owned concerns, the *Practical Engineer* says that the warlike policy in trade has taken a turn which should not be continued without careful consideration.

"A practice has been widely adopted in the Press of publishing particulars of the business of German firms trading or having works in this country. There are wide differences between these firms and there are circumstances which are not fairly taken into account. In the first place there are German firms which use British names and wilfully pose as makers or sellers of British goods. We have no excuse to offer for any kind of pretence or hypocrisy in business. . . . In these cases the facts should be laid before the Government and the law enforced. A further class of German-owned businesses are those which are properly conducted with no unfriendly intent and to which no objection would be taken but for the fact that the nation to which the owners belong has provoked an unjustifiable war and prosecuted it in an inhuman manner. To these firms the law allows a certain toleration. . . .

"There is, however, another and separate class of foreign-owned business which stands on a different footing, and of which there are many in the engineering trades and many German owned. Only a few years ago we revised our patent law in order to induce foreign owners of patents to make their special goods in this country. They were invited to come here and establish works. Men and leaders of all parties agreed that it was a great advantage to us that home labour should be employed and home rates and taxes paid instead of having the goods imported fully manufactured. There was no restriction as to the nationality of the ownership of these works and no suggestion that the profits must remain here. It seems to us that in these cases some consideration is due—always provided that during the war the firms rigidly observe the rules imposed. . . . The stranger invited into our territory who has not abused our hospitality cannot be treated like him who tries to break in.

"Above all, we feel that it is not the duty of the Press to hold up lists of individuals or firms to public hatred and contempt. Editors may be critics, but not judges or executioners. Personal malice is bad enough, but there is something terribly cruel about this kind of heedless wholesale malice which seeks to degrade national resentment into a kind of man-hunt. It is better not to mention specific cases, but there are some in which the attack was entirely without justification. The duty of the Press is to bring public opinion to a fair appreciation of general principles. . . . It is foolish to make a general attack on foreign goods or foreign traders. Our whole system of production is based on large exports and imports. Our true policy is to discriminate correctly as to the classes of goods

which we should encourage the importation of and the foreign nations with whom we should encourage business dealings. If we can establish clear principles of action on these lines it will be much better than spending our efforts in exhibitions of bad temper."

The *Hardware Trade Journal* deals with the matter on similar lines:—

"We are as determined as anybody to do all in our power to make this market impregnable to German goods in future. We shall continue week after week to render assistance to British manufacturers, so that by the time the war is over there may be no more call in these islands for German goods of any kind whatever. The grounds upon which we object to the importation of German manufactured goods are that they find employment for German workpeople, that they produce profits to German manufacturers, and that the majority of the benefits associated with their production are enjoyed in Germany instead of in England.

"But these arguments do not apply to the employment of German capital in this country. Great Britain has more capital invested abroad than any other nation in the world. An Englishman should be the last to object to the investment of capital abroad. But there are other and much more important considerations which lead us to think that we should welcome rather than otherwise the presence in this country of German capital. This money has been invested here very largely as the result of Mr. Lloyd George's last Patent Act, which made it necessary that British patents should be worked within these shores. The immediate result of that legislation was to bring over here large quantities of foreign capital to establish with foreign money large works and industries and to find employment for large numbers of British workmen. When an industry is established the capitalist is the very last man to benefit from it. Rent, rates, taxes and wages, all of which have to be expended in the locality where the industry is carried on, amount in every case to a sum many times the size of any profit made. If, therefore, the *Evening News* were to get its way and the concerns mentioned above were to be shut up as a result of its agitation, German capitalists might lose such interest as they may be receiving for their money, but a sum many times as big would be lost to English landlords, to English ratepayers, and to English workmen."

Our contemporary, *The Engineer*, emphasises the fact that the destination of the profits made in the course of manufacture and trade is of less importance than the distribution of wages, and quotes a concrete example from practice, where a locomotive was built at an actual cost of £2,800 for wages and material, whereas the profit that might have gone abroad would have been only £400. "The fact is that if a German or American firm elects to build a works in Great Britain it must spend a great deal of money here, and for that reason such undertakings have always been welcomed." On the other hand, it is pointed out that such a firm may buy its raw materials in its own country, thereby robbing the argument of much of its force, and it may act as agent for its own branches or head house in its own country, of which many examples could be given. But these practices can be provided against; "the matter rests in all important cases in the hands of the purchaser, and if he is patriotic enough to insist that the product he proposes to buy shall be wholly British, then wholly British it will be."

We have received the following letters:—

TRADING WITH THE ENEMY.

We have received a copy of the King's Proclamation "Relating to Trading with the Enemy," and have acknowledged same in the terms of the enclosed copy of letter to the Assistant Secretary of the Board of Trade (Commercial Department).

We are of opinion that the attitude we have taken up is a correct one, and we shall be glad to know that we have the support of all our British competitors.

For DORMAN & SMITH, LTD.,
REG. A. SMITH, *Director.*

Manchester, *Sept. 15th*, 1914.

[COPY.]

The Assistant Secretary, Board of Trade
(Commercial Dept.), Gwydyr House, Whitehall,
London, S.W.

Dear Sir,—We are in receipt of your communication of the 12th inst., enclosing copy of the King's Proclamation of the 9th September "Relating to Trading with the Enemy," and we further note that under Clause 5 (sub-clause 7) of same, it would be a contravention of the law to supply goods for the use or benefit of an enemy.

We have before us at the moment the status of the A.E.G. Electrical Co., Ltd., and as we are informed that the bulk of the shares of this company are, or were quite recently, held in Germany, we have declined to continue any business relationship with this company, in compliance with the above Clause 5 (sub-section 7).

We are, however, threatened with penalties by the A.E.G. Electrical Co., Ltd., for the non-execution of an order for which we had tendered, and we are asking for the support of our competitors in the attitude we have taken up.

For DORMAN & SMITH, LTD.,
(*Signed*) REG. A. SMITH,
Director.

Salford, *Sept. 15th*, 1914.

There appears to be a considerable confusion of ideas on the subject of trading with firms in this country whose capital is largely or exclusively of alien enemy origin. The following appear to me to be fundamental principles:—

1. This country must benefit by the employment of capital *for productive purposes* regardless of the place of origin of such capital.

2. Conversely this country must lose by the non-employment of such capital.

3. Although not material to the point at issue, this country benefits most when the owners of such capital are citizens living in this country.

4. Every possible means must be taken to prevent any of the profits on enemy-owned capital, or any of the assets representing such capital, from leaving the country.

Any refusal to have dealings with concerns whose capital is largely alien enemy-owned, but who are employing such capital for the purposes of production in this country, is therefore only liable to do harm to the country. The position is obviously entirely different in the case of firms who only import and thus employ the capital in an almost entirely non-productive manner.

On the other hand any actions which allow profits or any other assets of such concerns to go to the enemy are traitorous actions. It is the duty of the Government to see that no such actions are possible, and I suggest, as a practical method of preventing this, that all capital held by persons or firms whose address or business is in the enemies' countries should be transferred to trustees appointed by the Government until a treaty of peace is signed. This would have a double advantage, especially in the case of those companies whose business is virtually controlled by the aliens' holdings:—

1. That it would be definitely assured that none of the assets or profits of the companies go to the alien enemies during the war.

2. That when terms of peace are being considered this country would be in a strong position to assure the proper treatment of English capital invested in the enemies' countries.

F. B. O. HAWES.

London, S.W., *Sept. 15th.*

WAR ITEMS.

WHAT CONSTITUTES A BRITISH FIRM?—The following letters on this subject have come to hand:—

With reference to the correspondence regarding the position of such firms as Messrs. Siemens, it really seems to me that we ought to give a preference to all-British firms. Although if all orders were at once withheld from Siemens it would cause hardship to their workmen; if a mere preference were given to others, it would surely mean Siemens's trade being partially and gradually absorbed by all-British makers, with little or no harm to anyone but the shareholders, and undoubted advantage to those who secured the trade. J. S.

In the last paragraph of Mr. Justus Eck's letter in reply to Mr. Evershed's, he states that the "British directors were elected by the British shareholders to protect their interests."

The British shareholders, according to the records, appear to be Francis Eck, of Chiswick, one share, L. Reincke, of London, 166 shares, and Justus Eck, of Chiswick, 502 shares.

As Mr. Justus Eck is a director of the company, and holds 502 shares, it would be interesting to know why Francis Eck and L. Reincke require the services of two further directors, Mr. Marshall, of Chiswick, and Mr. E. Moul, of Herne Hill, to look after their interests, which represent 167 shares out of a total of 24,250 shares.

For LANGDON-DAVIES MOTOR CO.,
P. F. BRITTAIN.

London, E.C., *September 11th*, 1914.

Now that the fact of German companies operating in England has been brought before the notice of the public, it is time that purchasers of electrical plant took steps to avoid buying their goods.

Is it not true that the Tudor Accumulator Co.'s shares are largely held by German shareholders, the large profits thus accruing both now and in the past having in a large part gone to assist the enemies of this country?

Is it not a fact also that this company employs a considerable number of both German and Austrian workmen?

Surely the time has arrived when Corporations, public bodies, contractors and the public should insist on buying goods made by British labour and capital, instead of, as hitherto, placing orders with alien firms, and thus contributing to the funds of the enemy, which has enabled him to amass such large armaments aimed at the destruction of our homes, and of the British people and Empire.

Your publication of my letter in your next issue, I am sure, would interest not a few

BRITISH INVESTORS.

I notice in some of the electrical papers various letters which inquire into the composition of the British Thomson-Houston Co., Ltd.

Although the files of Somerset House tell the whole story, few take the trouble to make an examination, and, therefore, the following may be of interest, and I shall appreciate it if you will publish the information in full:—Our capital consists of 80,000 shares of the par value of £10 each, and £186,215 debentures. Our shares are held as follows:—

44	English shareholders	10,458
11	French ,, ...	3,109
1	Belgian ,, ...	83
9	American ,, ...	64,876
1	German shareholder resident in Cologne	333
1	German shareholder resident in England	1,141
		80,000

Neither of these last two shareholders, so far as we know, are in any way connected with electrical manufacturing companies either here or in Germany.

We have 106 debenture-holders, all of them resident in England, and all English, with the exception of one French lady, who holds £2,000 par value, and she resides in Folkestone. We have not a single German in our employ, or in any way connected with the company.

Our active board consists of the following:—J. F. Nauheim, who represents the shares held by Lord Rothschild in our company. He has resided here most of his life, and has been naturalised between 30 and 40 years; George Franklin, of Sheffield and London, who was at one time Lord Mayor of Sheffield, and who was chairman of the National Telephone Co.; Owen H. Smith, who came on originally to represent our debenture-holders. He is one of the partners of "The Proprietors of Hay's Wharf, Ltd."; F. Fraser, a Scotsman, who is also our secretary; W. C. Lusk, manager of our commercial departments; H. N. Sporborg, our chief engineer; and myself, the managing director. We (the latter three) are American born, and have been here from 10 to 12 years.

The other members of our board are, three Americans residing in New York, who represent large shareholders, and one of them for many years resided in London, namely, C. A. Coffin, E. W. Rice, jun., E. A. Carolan. The two former are chairman and president respectively of the General Electric Co., of New York, the patents of this company and its predecessor—the Thomson-Houston Co.—forming the original basis of our company.

C. Burrell, an Englishman, who has spent most of his life in France, now living in Paris; E. Thurnauer, who is an American citizen, also living in France. These two are managers of the Compagnie Française pour l'Exploitation des procédés Thomson-Houston, and represent on our board the French shareholders. The total number of our employés is about 5,600, a large number of whom are, of course, young women in the lamp factory. Our factories are at Rugby, Coventry and Willesden.

So far about 900 of our employés have joined the Colours, which is over 50 per cent. of those who are eligible, and all who have joined, both married and single, receive half wages or salaries while they are away, and their places will be kept open for them until their return, to the fullest possible extent. I might also add that no changes have been made in the salaries of those who remain in the company's employ.

H. C. Levis, *Managing Director*,
British Thomson-Houston Co., Ltd.

London, E.C., *September 14th*, 1914.

In my letter which appeared in your issue of the 11th inst., p. 362, I referred to rumours in circulation to the effect that the A.E.G., of Berlin, were transferring some of their British orders to the British Thomson-Houston Co. The only object in mentioning this was to give the B.T.H. an opportunity of publicly contradicting these rumours, and I have much pleasure in stating that I have received a letter from them in which it is stated that no orders have been transferred to them by the A.E.G., nor have they supplied any apparatus to this company, or to the subsidiary company in London or elsewhere since the outbreak of the war.

I have also, as a result of my letter, received the information that most British firms have been approached by the "A.E.G. Electrical Co." (that is the London house), who desired to place orders with them, and possibly this is the source of the rumours referred to.

Frank Broadbent.

London, E.C., *September 15th*, 1914.

May I add myself to the number of those who express agreement with Mr. Campbell Swinton's view that it is unpatriotic at the present time to give new orders to a firm like Siemens, the majority of whose shares are held by Germans, and which is controlled from Germany?

No doubt there is some truth in Mr. Hammond's contention that to boycott Siemens might in time lead to their reducing the number of their employés. Unemployment in the electrical trade, however, is bound to become prevalent while this war continues, as there will not be sufficient work to keep everyone busy. Is it not, however, the most patriotic thing to so distribute orders that the purely British concerns should be able to continue full employment the longest?

A.M.Inst.C.E.

London, *September 14th*, 1914.

As an old Siemensite, I would like to express an opinion on the recent criticism levelled at Mr. Alexander Siemens, and the English branch of the firm with which he is associated.

As a Britisher, I am in agreement with the suggestion that any profits now being made by the English branch of Siemens should, during the war, be switched off from the enemy's circuit. What I protest against is the unwarrantable attacks made by Mr. Campbell Swinton, Mr. E. J. Williams and "X" on Mr. Alexander Siemens and the English branch of the Siemens firm in general.

Anyone connected with the electrical industry during the past 25 years will, I think, admit that the firm of Siemens (also such firms as Crompton, Ferranti, Mather & Platt, Ediswan) worked to a higher ideal than the making of mere dividends. They did a great deal of pioneer and experimental work in which the question of dividends was a secondary consideration compared with the advancement of the electrical industry. To those gentlemen who have seen fit to criticise the firm of Siemens in this channel, I would like to refer them to a book entitled, "Get on or Get Out," written by Peter Keary, and published by C. Arthur Pearson, Ltd. On page 55 of this book will be found an absolutely impartial tribute to the work of the late Sir William Siemens. Keary's reference to Siemens shows that there was a higher object in the man and his firm, than the making of dividends, as suggested by Mr. E. J. Williams. Some years ago the L.B. & S.C. Railway Co. had one of their passenger locomotives named Sir William Siemens, and I believe the L. & N.W. Railway Co. also have recently named one of the main-line locomotives Alexander Siemens. I suggest that these little honours are in recognition of something more than the making of mere dividends.

With regard to Mr. Campbell Swinton's reference (in the Electrical Review of September 5th) to Mr. Alexander Siemens having at the present time sympathy with the land of his birth, this, I think, is a most unwarrantable and uncalled-for insinuation. Mr. Campbell Swinton can have but little conception of Mr. Alexander Siemens's honour and integrity, which I am pleased to see has been so ably defended by Mr. J. E. Kingsbury and Mr. Robert Hammond.

George Elliott Kerss.

Liverpool, *September 14th*, 1914.

Mr. Kingsbury, in to-day's issue, puts into moderate but deservedly definite terms sufficient condemnation of rushing into print without a sense of proportion. Even electrical men can afford to avoid "the easiest and most worthless sort of patriotism."

In all that I have read about Siemens's shareholders resident in Germany, no one has accused them of advancing to those employés of Stafford Works who are now fighting against us, the pay allowance given to those fighting for us.

There has been no mention of many concerns in Germany whose shares are owned by British subjects resident here.

Concerning Mr. Robert Hammond's proposed legislation against all foreigners, I think the first point to be investigated is to what extent British investments in Germany counter-balance German investments in England, and later other countries can be similarly dealt with.

It may prove to be true sense and economy, after this investigation, to say no more about Messrs. Siemens. I assume the agitation is free from the spite of a jealous competitor.

To limit a foreign shareholder's direct or indirect holding in an English company to 49 per cent. of that company's capital would be initially a simple matter on paper, but basing an opinion on necessities of existence which have arisen in more than one company with foreign shareholders in the recent past, such a limit could not reasonably be maintained.

I refer to companies whose existence has depended on additional money raised from time to time abroad, where "distance lends enchantment" to the investment, when the shareholders near at hand knew too much to put more good money where it demanded continuous patience awaiting dividends that failed to materialise.

The maintenance of a legal maximum 49 per cent. limit would have necessitated the death of such companies; the absence of a limit allowed them to keep alive. England might have gained more from more efficient management of such concerns; but large amounts of foreign capital spent in England on unremunerative work and subsequently written off, are losses to the foreigner and not to England or Englishmen.

If there is to be any maximum limit to the foreigner's holding in British companies it should be zero. If the foreigner builds up on foreign capital a business in England, he is entitled to his dividends, unless his country is at war with England.

My imagination does not picture Germany, after the war has been ended to our satisfaction, as populated only by retired capitalists with only foreign investments, nor with Krupp's and all other works razed beyond hope of resurrection.

Theodore Stevens.

London, E.C., *September 11th*, 1914.

In view of correspondence which has recently taken place in your paper, may we point out that our firm here is in every sense of the word a British business. We have been established here for close on 50 years, and this is our only works, and here are manufactured all the goods which we sell. All our directors, and all our shareholders are British citizens, with the exception of one small shareholder in Christiania, who is our agent in Norway, and no German or Austrian is in any way interested in a single penny piece of our capital.

We may say that close on 100 of our employés are now serving with the British forces.

I. Frankenburg & Sons, Ltd.
Hubert Standring, *Director*.

Salford, *September 14th*, 1914.

As the bearer of a name of extremely Germanic origin, although it belongs to my family, who have held Government positions in Cape Colony for the last 130 years, I beg to be allowed to pour a little cold candour on the letters appearing in your "Correspondence" columns.

The telephone trade in this country is a typical instance of lost British opportunities. Do we not all remember Mr. Isidor Birnbaum's invasion of this country in conjunction with the Berliner Telephone Co.? Did he not set the pace as soon as he possibly could in trade conditions over here? Are we going to imagine that he changed his name and his firm's name to something essentially British merely out of passionate devotion to the country of his adoption? No. He found that by doing so he could climb to greater heights, and now with English names for himself and company, his achievements are all the greater, and the means, therefore, have justified the end. But what is the end from the present position? Soon after war broke out the Telephone Manufacturers' Association met, and what did they find? They found one of their principal members had been relying upon foreign factories for wood cases. Another member, who had a very large control of the mining telephone business, was cut off from Continental supplies, and so on, with the result that the trade has a happy instance of the "patriotism" of the T.M.A. in a formal announcement that discounts are from henceforth reduced by 13 per cent. This is the price that this country is now going to pay for not having provided more energy and capital within its own boundaries.

It is a notorious fact that there is, I think I am perfectly correct in saying, not a single firm cataloguing telephones in this country that can absolutely and truthfully declare that every part of the instruments displayed in their catalogues, and quoted for by them, is completely made in this country.

The same thing very much applies to the electric motor industry. One of the largest outlets for motors in this country of recent years has been the textile trade, and who can gainsay the fact, that one very well-known make of German motors has collared the cream of the trade at good prices, not cut prices, because of their splendid guaranteed factors of efficiency?

A few words as to Mr. Eck. It may interest Mr. Evershed to know that Mr. Eck has a connection with a "Birmingham" firm, and doubtless if Mr. Evershed will produce his pass-book for Mr. Eck's inspection, Mr. Eck will be quite willing to produce his agreements with the Birmingham firm.

What I plead for, Sir, is, do let us drop this hypocrisy about British-made goods, when only within the last two years a British battleship was fitted with foreign-made telephones, supplied by one of the British firms of oldest standing.

Instead of now trying to break up enterprising, clever, and energetic people, who have been building up business in this country for years, and, at any rate, providing money for a large number of the labouring class and higher classes, and paying rates and taxes and income-tax in proportion to the size of their undertakings, let us humbly sit down and acknowledge point-blank what we have been lacking in as Britishers in the past, and make up our minds now not to cry "sour grapes," but that such things shall not happen in the future.

We hear in the lay Press a lot about pipe lines of gold to the Continent. I think Mr. Burney could, provided with the aid of a micrometer gauge, give some very interesting particulars as to the size of his particular pipe line to the Continent since he started his works in this country.

Siemens, I take another very good example of the same condition of affairs, for in their development and progress in this country they must have spent money very lavishly, and in their treatment of the trade their name, surely, compares with any firm in this country, whether of British or foreign origin, or a mixture of the two.

May I conclude, Sir, with the hope that your columns will not again be disturbed with unnecessary protestations of patriotism on behalf of people whose clever business objects are thoroughly understood and admired, nor will you be asked to further display a series of petty and narrow views about the condition of affairs which has been plainly evident to all investigators of trading conditions in the electrical industry for the last seven years.

Yours faithfully,

H. S. HÖHNE.

May I briefly reply to some of my critics?

One of Mr. Robert Hammond's main points is that we must be careful what we do, or we may not in the future be able to attract foreign capital. So far as our foreign friends are concerned I quite agree; but with regard to our enemy, Germany, let us hope that when peace comes to be made it will be arranged on terms whereby Germany will be compelled to pay an annual indemnity for many years, so large that neither she nor any of her citizens will have any money to invest, either here or elsewhere, for at least a generation.

Then, with regard to Mr. Hammond's suggestion, that if new orders are not given to Siemens Bros. this will result in unemployment. Unemployment there is sure to be, for, as long as this war continues, there is bound to be a considerable restriction in the amount of work to be placed. Under these circumstances, surely it is best and most patriotic to give orders, as far as possible, to the concerns that are purely British, and thus keep their men fully employed, rather than those employed by aliens.

I am sorry that Mr. J. E. Kingsbury is so annoyed, but I can afford to disregard his strictures, as when he says that my letter will be read by my friends with much regret, I am sure he has made a great mistake. Some, of course—for example, Mr. Robert Hammond—have not agreed with the opinions that I have expressed, but I have so far not come across anyone, except Mr. Kingsbury himself, who has objected to my methods. Indeed many have congratulated me, while a number have even taken the trouble to write to me, specially to express their approval, and among these latter are several men well known in the electrical world, together with one of the most eminent engineers of the present day, who writes, "I read your letter in the ELECTRICAL REVIEW, with the greatest pleasure."

A. A. CAMPBELL SWINTON.

London, S.W., *September 15th*, 1914.

I have read with very much pleasure your leading article "Looking Ahead." It is certainly one of the most carefully written and considered articles on the subject which have appeared in any journal, and deserves a much larger number of readers than it probably will obtain.

I would like to offer, for the consideration of yourselves and your readers, one or two remarks on the question of what constitutes a British firm, especially with regard to the Siemens companies. It must be a matter of general opinion on the part of all quietly thinking men, that to oust a firm that has done so much good in every way for the electrical industry would be suicidal. At the same time it must not be forgotten that the Siemens companies in this country are conducted in quite a different manner to the Siemens companies in Germany. It should also not be overlooked that although a large proportion of the capital is supposed to be held in this country, yet there is not the slightest doubt that this capital is merely held as nominee for the German portion of the firm, whether individuals or otherwise. Therefore it follows as a matter of course that the ultimate direction or power of the company could be controlled by the German policy. Now, the German policy is totally different to the English policy, and anyone who has had dealings, on a large scale, with the German element, will bear me out when I state that that policy is like the military policy we have just had exhibited to us—perfectly ruthless. Moreover, it should be always borne in mind that the German Siemens & Halske, together with the heads of various other powerful corporations, were the top and tail of the scandalous Press Bureau recently exposed by our Government. This organisation was known to many others outside the Government, and long before the exposure was published. It does not need much imagination to believe that other things besides Press notices were included in the offices of this cabal, performed for the service of their Government. Consider for a moment the fact that all these English branches of these German corporations have had, in the past, perfectly free access to the plans and organisation, &c., of practically every large undertaking in this country, including docks, collieries, works engaged in shipbuilding, armaments, &c. It is quite probable that in most of these British branch business concerns a "German" department would be found wherefrom much information of a very valuable nature might be imparted to the parent Government—in any case it would be available. I do not suggest that Siemens or any other specific firm has, during the past, made a practice of sending plans of these works, docks, &c., to their Government, but nevertheless the information has been available. In my opinion the only thing to do in the case of companies like Siemens is to get rid entirely of the German influence and control, so that the general conduct of the business is absolutely in the hands of British interests. Under those circumstances, I consider it would be the greatest mistake to do anything detrimental to the welfare of these firms, otherwise I consider it the greatest danger to allow them to continue to work in the manner hitherto.

I do not write you on this subject without considerable knowledge and experience.

September 15th, 1914. CENSOR.

With regard to Mr. A. A. Campbell Swinton's letter in your issue of September 4th, and that of Mr. Sinclair in your issue of September 11th, I enclose a cutting* from the *Times* of September 12th.

The *Times* state to-day that they have investigated the identity of the writer, and any further comment on my part would be superfluous.

It only remains for me to add that I personally intend to boycott German goods, and that I have reason to assume that a similar course will be adopted by my company.

ROBERT C. PIERCE, *Manager and Engineer, Cambridge Electric Supply Co., Ltd.*

Cambridge, *September 15th*, 1914.

We have received a circular letter from Mr. W. P. Maycock, in the course of which he appears to regard himself as an authority on how electrical journals should be conducted, but we regret that we have no room for circular letters.

MORE FALSE REPORTS.—The Record Electrical Co., Ltd., writes to say that a statement that is in circulation to the effect that the company is financed by capital of an alien enemy is entirely false. They add that "they will take immediate action in the Courts against any person who, to their knowledge, is party to the circulation of such libellous report."

THE ENEMY'S TRADE.—Your contemporary of September 11th—there is no need to say which it is. Having in the past cherished a distinct admiration for those who are now known as the "alien

[* The cutting relates to the terrible deeds of barbarism practised by the Germans, instances of which are vouched for by the writer. —EDS. E R]

enemy," having admired their organisations, their thoroughness, their culture, their apparent goodfellowship and furthermore *having said so*, it came as a very nasty knock to me to see them as they really are "with the veneer off."

Only during the past month has the average Briton known what we are up against in deceit, barbarity and lawlessness, and realised what we have had prepared against us in the way of naval, military and trade attacks. How any man (other than an alien enemy), knowing the vile tactics employed by our opponents, can ask for quarter for the enemy's trade in the way that your contemporary begs electrical men to do is past my comprehension.

Fortunately your own vigorous leading article, which I read immediately after the other, came as a most effective antidote.

In view of my known appreciation of our quondam friends (*sic*), I did try to prevent myself letting go in print, but your contemporary has raised my bile. I do not believe any Briton could make himself stoop to the level of the enemy's methods, but the least we who remain safely at home can do is to second the work of those who are fighting for us, by making it our solemn business by fair means, and even to a discretionary extent by foul, to capture the enemy's trade and smash him industrially.

Give him no rest till he is broken commercially beyond repair, as he is undoubtedly going to be broken as a European military power.

A. Hugh Seabrook, *General Manager*,
Marylebone Electric Supply.

London, W., *September 14th*, 1914.

Not Paying at Present.—Referring to our letter addressed to you last week, in fairness to Messrs. Traun & Sons, we beg to enclose you copy of their reply to our letter, together with our answer.

Nalder Bros. & Thompson, Ltd.
Fras. H. Nalder, *Managing Director*.

London, N.E., *September 14th*, 1914.

[copy.]

Dear Sirs,—We are in receipt of your favour of the 8th inst., and we should like to call your attention to the following, and trust that this will satisfy you.

The managers of this London agency are both, and have been for many years, naturalised British subjects. They have through their solicitors made inquiries at the Board of Trade as to their position *re* further trading, and have been informed that there is no objection to their carrying on business.

In order to be able to do this, and to keep and pay their employés and their British creditors, they cannot do without customers' remittances. They undertake, and are bound, as British subjects, not to remit any money to Germany, and they trust, therefore, that you will send your cheque in due course, which please make payable to F. Winter.

H. Traun & Sons' London Agency.

25, Goswell Road, E.C.
September 9th, 1914.

[copy]

Messrs. Traun & Sons' London Agency.

Dear Sirs,—We beg to acknowledge receipt of your communication of the 9th inst. *re* ours of the 8th inst., and we can only reiterate what we said in our last letter, that if the Courts consider that you are entitled to be paid, we shall be pleased to do it, but we would point out that, taking your address in the "Telephone Directory" and elsewhere, it appears to us that if we paid this account we should be breaking the laws recently amended and passed dealing with the question of assisting alien enemies.

Nalder Bros. & Thompson, Ltd.

September 14th, 1914.

American Trade and the War.—The attention which our cousins in the United States are giving to the present trading opportunity is shown by the amount of space which the *Electrical World* devotes to the subject. Dealing with credits in South America, it says:—"Many people have spoken and written about the need of granting long-time credits to South American buyers of electrical apparatus. Manufacturers have been cautioned that the South American buyer regards payment in three or four months as equivalent to cash. Carry the argument a little further, and it appears that a long-time payment, as that is known ordinarily in this country, would be postponed in South America to a month far distant on the calendar. This condition arises in part from a lack of capital, and it is strengthened by the lifetime practices of our neighbours on the south. Whatever terms are essential for our manufacturers to make they will make. In the past they have felt that they were handicapped by a lack of knowledge of South American customs, lack of banks and lack of American shipping facilities. In reality these obstacles seemed more serious than they were. Knowledge can be acquired, the National City Bank, of New York, is to start branches, and American shipping facilities are already in a fair way to be provided. Foreign banks have always been open in South America, and shipping facilities under flags of other nations have been plentiful. Bankers and manufacturers know that the question of credit is like any other business problem. It is answered by the same reasonable rules that are applied to all business problems. If long-time credit is a factor in a sale, it is a factor in the cost. The expense of financing the account is a part of the expense of producing and financing the goods. If the buyer gets long-time credit, he is not on the same basis with the buyer who pays cash. If the credit involves undue risk of principal, that is another factor to be reckoned with in the calculation of cost. No new market can be entered easily or without advance preparation and expense. To these difficulties South American countries add the problems of different language and customs and of long-established relations with European business men. Like the question of credit, these problems have a reasonable solution which it has now become the duty of manufacturers to discover."

A further article is couched in the philanthropic vein:—

"Producing centres in this country are ready to meet the demands thrown upon them at short notice. The war has created markets for many classes of products in European lands and in the countries formerly supplied from Europe. . . . The importance of electrical exports has been pointed out in the articles published in the *Electrical World*, not because 'one man's misfortune is another man's advantage,' but by reason of a world-wide demand unfilled. A situation without precedent has arisen in our industries. Neutral countries are crippled because they relied upon European sources of capital and materials and European markets. Commercial relations cultivated during many years are swept away in the torrent of war.

"No countries ever before deliberately sacrificed commercial life on the scale of the terrible exhibit in Europe. Trade between the countries directly engaged in the war is fatally hurt. Trade between each of those countries and other nations now at peace is interrupted, and, except in the event of an early conclusion of hostilities, it cannot be easily restored. Too much capital and too many trained workmen will have been sacrificed to enable European nations to resume quickly their banking and commercial relationships with the countries which heretofore depended largely on their assistance. If peoples wholly innocent of part in the war are to have the burdens lightened for them, it will be because a strong nation like ours is ready and willing to do its part toward that end. Only by time and patience can the needs created by the commercial inactivity of Europe be met. Where this country has been dependent on Europe for raw materials, other materials or substitutes, so far as they can be found, will be introduced. Temporarily crippled, some manufacturers in this country will learn how to use what is at hand to take the place of that which they cannot now import. For the nations involved the terrors of war will not be lessened, but our activities will protect other peoples against the dire consequences of a strife not of their making."

A Warrington Contract.—The wisdom or otherwise of accepting tenders for electrical goods of German or Austrian origin was discussed by the Warrington Board of Guardians at a special meeting last Friday. At an ordinary meeting of the Board held earlier in the week, the opinion was expressed by Mr. W. C. Brooks that the time had arrived when they, as a public body, ought, as a duty, to put a ban on German and Austrian goods. On the other hand, the Rev. A. M. Mitchell, another member, declared that he did not think that they ought to punish individuals and firms because of the attitude of the Imperial autocracy at Berlin. When the question came up for discussion on Friday, it arose on consideration being given to contracts for electrical goods and ironmongery. Mr. Brooks moved a resolution to the effect that the contracts so far as they related to goods of German or Austrian origin be not accepted. The resolution was seconded, but some objection was raised by certain members of the Board, who argued that the tenders were invited before the outbreak of war, and that wrong would be done to the contractors (who, no doubt, had the articles in stock), by the imposition of such a restriction as that proposed. Eventually, however, the resolution was adopted by five votes to two. Mr. A. J. Jolley (chairman) remarked that the resolution would apply to all contracts in which there were goods of German or Austrian origin, and the effect of it would be to find employment for British labour. After the meeting the clerk to the Board issued an amended advertisement, inviting tenders for electrical goods required at the workhouse, and the stipulation was made in bold type that no goods of German or Austrian origin would be accepted.

The Board of Trade Helps.—Further pamphlets forming part of the useful series issued by the Board of Trade Commercial Intelligence Department, bearing upon the special departments of the export trades of Germany and Austria, are as follows:—Screws, nails and bolts, and nuts of iron or steel; iron or steel plates and sheets (other than tinned and galvanised); railway material of iron and steel (except rolling stock and wheels, tires and axles); lubricating oils and grease.

The Department has received the following information by cable from H.M. Consul-General at Shanghai (September 8th):—"Business may be said to be more or less at a standstill. The situation is governed by the export trade, which is held up; and money is tight principally on account of this stagnation. The Germans are accepting export cargo which is being deposited in godowns, but Chinese sellers are at present without payment. This fact will undoubtedly react in favour of British interests."

The Board of Trade has received the following information by cable from H.M. Commercial Attaché in Japan:—

"Business is being very seriously hampered by international difficulties which have arisen. It is suggested that United Kingdom firms transacting business with Japan should consult exchange bankers with a view to having their shipments to the Far Eastern markets financed. The attitude of the Japanese banks is exceedingly cautious. It is estimated that at present the stocks of dyes in Japan are sufficient for six months' requirements. Large Australian contracts for wool and lead are being held up owing to difficulties of finance. As regards exports, shipments of silk continue to show a falling off, while copper shipments are at a standstill. Exports to China of cotton yarn for the manufacture gun-cotton have fallen off 50 per cent."

The British Ambassador at Rome has cabled as follows:—"I am informed that the present moment would be a favourable one for a competent Italian commercial traveller or agent to go to Milan and obtain orders for goods hitherto supplied by Germany. Amongst such goods for which there would be a demand are carbons for arc lamps, magnesium, silica, bricks and special types of steel."

His Majesty's Consul at Milan telegraphs that the British Chamber of Commerce there has received inquiries from local firms who are desirous of purchasing the following classes of British goods, viz.:—Tanned leathers, leather goods, hides and skins, glass tubes, glass gauges, chemicals, machinery, dynamos, bicycles, iron and steel, motors, carburetters, and motor-cyles.

Belfast Electricity Works.—The city electrical engineer reported on 7th inst., that up to that time 23 of his staff had joined the Colours, and that he was having the vacancies temporarily filled.

Westinghouse Brake Employes.—We are informed that, down to Friday last, 118 men from the works and offices of the Westinghouse Brake Co, Ltd., had joined the Colours, representing upwards of 28 per cent. of the normal establishment. The company is paying these men half-rate wages, and places are kept open for all who return to them on the expiration of such service.

Halifax.—Between 40 and 50 tramway employés have enrolled in one branch or other of the Army.

Hart Accumulator Relief Fund.—Over 40 employés of the Hart Accumulator Co., Ltd., have gone to the Front, and in order to relieve any distress in the families of these men, the whole of the remaining employés are contributing two hours' pay each week, so as to be able to grant to each family sums ranging from 15s. per week downwards, depending on the circumstances of each case. These subscriptions are entirely voluntary, and the fund is largely augmented by personal weekly contributions from the directors, and also by a weekly grant from the company. All places are kept open for the men on their return.

No Name.—"H. T. Gear" has omitted to send us his name and address. It should be remembered that we cannot publish letters which are not accompanied by that information.

Liverpool Tramwaymen.—Alderman F. Smith at Liverpool on Friday stated that 430 of the staff of the tramways in that city had joined the Colours, and that the Tramways Committee did not approve of the suggestions which had been made that all the employés under 35 should be compelled to either join the forces or retire, and that women should be substituted on the tramcars. At present, he added, it was not necessary to entertain the idea of displacing the men by women conductors.

Bolton.—The tramway workers of Bolton have decided to pay a levy of 1d. for each 5s. earned per week to the local relief fund during the war.

Danish, not German Origin.—United Water Softeners, Ltd., of Imperial House, Kingsway, London, W.C., request us to state that the company, who claim to be the largest manufacturers of water-softening and purifying plants in the United Kingdom, have no connection in any shape or form with Germany, German subjects or German products, and no interest or control, either financial or managerial, is held in this company by Germans. The concern is managed by three British directors, one Danish, and one Danish naturalised Briton. The water softening and purification plants, in which the company exclusively deal, are all manufactured in Great Britain by British workmen, and the technical and clerical staffs are entirely British. All rights in the "Permutit" patents are under the sole and exclusive control of the above British company.

Chloride Recruits.—At the works of the Chloride Electrical Storage Co., Clifton, last week, the employés, together with the workers at the Pilkington Tile and Pottery Co., attended a meeting called for the purpose of stimulating recruiting. Mr. W. Bannister, chairman of the Chloride Co., who presided, said it was essential for all who could to go forth to help in the battle for freedom and right, and he hoped the company's employés would respond to the call. It was announced that 19 of the firm's employés were already serving with the Colours, and that 14 more had volunteered, whilst at the close of the meeting several young men signified their willingness to enlist. An allowance of 10s. per week is being made to the wife of each married employé who enlists, together with further allowances for children, and dependants of single men employed by the firm are also being generously treated. To every employé accepted for service, the firm is making a grant of £5 to be paid in such a way and at such time as the manager thinks fit.

Salford Corporation Contracts.—At a meeting of the chairmen and deputy-chairmen of the Corporation Committees at Salford, it was decided to bring the following resolution before the next meeting of the Council: "That the Council be recommended to direct that all contracts entered into with the Corporation be adhered to, with the exception of such contracts, or parts thereof, as involve trading with alien enemies; to rescind all resolutions to the contrary; and to inform the various Committees accordingly."

Messrs. Drake & Gorham, electrical engineers, of Manchester, are paying 12s. 6d. per week to the wives of their married employés who have joined the colours.

Mr. T. Haughton has been co-opted a member of the Dukinfield Relief Committee as representing the Tudor Accumulator Works.

Sydney Cancels German Order and Places it at Rugby.—We learn that Messrs. Willans & Robinson, Ltd., of Rugby, have secured an order from the Sydney Corporation for a 5,000 kw. turbo-alternator with condensing plant, the plant consisting of a standard Willans "disk and drum" turbine, to be coupled to a Dick, Kerr alternator, and the turbine exhausting into a Willans surface condensing plant with rotary air pumps. This plant is to take the place of a German plant ordered a short time ago. The municipality has given the firm terms of payment embodying monthly instalments, as the work proceeds, up to a total of 80 per cent. of the value of the contract on shipment. It is very gratifying to receive this further evidence of Australia's assistance in the struggle. The granting of favourable terms just now will be a boon to our industries. Messrs. Preece, Cardew & Snell are acting as engineers in this country for the Corporation.

Joined the Colours.—Seven members of the staff of Messrs. W. F. Dennis & Co. have gone on active service.

W. Geipel & Co.—This firm write to contradict rumours that they are aliens, and to explain that they are absolutely British, having been established here close on half a century. The firm has a works in London.

German Turbo Plant not Re-Ordered.—The *Leeds Mercury* states that there is considerable uneasiness in the engineering trade over the fact that business relations with German firms have not been completely broken off. "The case of a colliery company, which ordered three large turbine generators from Berlin some months ago, is being widely discussed. One of the machines is said to be on board ship at Hamburg, the second completed at the Berlin works, and the third in an advanced stage of construction, and it is felt as a hardship by British firms who make similar plant that the colliery company has not given the replacement orders to them, but is apparently waiting for the end of the war to release the German machinery. In the engineering trade, as in others, it was hoped that orders of this character would have helped to keep their men employed during the present difficult period."

The Brighton Railway Contract.—In the House of Commons last week, Mr. J. M. Henderson urged that the Trading with the Enemy Bill should provide for the stopping of the business in this country of limited companies, the vast bulk of the shares in which were held by companies in enemy countries. The large German electrical company which obtained the contract for electrification of the Brighton Railway registered as a company in England, with 30,000 shares, 29,993 of which were held by the parent company. If the Dresdner and Deutsche Banks were to be prevented from doing fresh business this company should be treated similarly.

According to the *Daily Telegraph* report, Mr. Duke said that the adoption of Mr. Henderson's proposals would inflict a tremendous blow on industry and employment here. There was one company which was engaged in the electrical industry which employed over 2,000 workmen. If the alien interest in it were destroyed, the sole result would be to put out of existence an industry in regard to which the sole concern of this country was that it should be carried on and provide employment here. In the case of another company, the business of which had been acquired by German capital, 1,400 skilled workmen would be thrown out of employment. He pointed out that the proclamations issued would prevent communication between those who conducted such businesses in this country and those who, beyond the sea and down to the beginning of the war, controlled them.

Mr. Joynson-Hicks said there was reason to suppose that some large electrical engineering firms which were thinly-veiled German firms were doing work for the Admiralty, and were in touch with the secrets and insides of the ships.

Sir J. Simon remarked that what they wanted was to prevent the enemy profiting by transactions carried on here. On the other hand, they did not want to take any steps which would interfere with British interests, including commerce and employment. He would see that the suggestion made by Mr. J. M. Henderson was carefully considered, but there was an advantage in treating a company the shares of which might be largely held abroad as a British company, because if it entered into operations with the parent foreign company it would be committing a crime. That he thought was the best way of approaching the subject, and power had been taken to examine the books and documents of any enterprise in this country against which suspicion might arise.

Messrs. Siemens and Government Contracts.—In the House of Commons on Tuesday, Mr. Tyson Wilson asked the Postmaster-General whether the firm of Messrs. Siemens, of Woolwich, was still executing work for the Post Office; and, if so, if he was aware that 65 per cent. of the shares in this company were held by Germans, that the firm had employed German workmen in the place of English workmen, who refused to work contrary to the rules and customs of the trade; and whether, under these circumstances, he would cancel any contracts that this firm may hold.

According to the *Morning Post* report, Captain Norton (Assistant Postmaster-General) replied: "Messrs. Siemens Bros., of Woolwich, are still executing work for the Post Office as well as for other Government departments. My right hon. friend understands that, although the company is a British company, a large proportion of the share capital is held by Germans, and that the firm has employed a small number of German workmen, but he does not think that these considerations outweigh the inconvenience to the public service and the adverse effect on a large staff of English workpeople which would result from the withdrawal of Post Office contract work. My right hon. friend is not aware of any such cases as are mentioned in the question, but if the hon. member will furnish particulars of the circumstances in which Messrs. Siemens are alleged to have infringed the rules and customs of the trade he will have inquiry made into the matter."

During the two weeks ending on Saturday over £930 was collected on the Manchester tramcars by means of the disused ticket boxes. The money is for the war relief fund.

BUSINESS NOTES.

Lamps for Canada.—A Montreal company desiring to purchase supplies of tungsten lamps, invites offers from United Kingdom manufacturers of such lamps of 10, 15, 25, 40, 60, 100, 105, 250 watts and 110 and 115 volts. The lamps should be made of continuous drawn-wire tungsten with screw socket suitable for the Canadian market. Apply to Board of Trade Commercial Intelligence Department, London.—*Board of Trade Journal.*

Permanent Magnets.—The Esterline Co., of Indianapolis, U.S.A., notifies that it is prepared to furnish permanent magnets on short notice, having a complete department for manufacturing these for electric lighting generators for automobiles, tachometer generators, and graphic instruments.

Mr. Lionel Robinson, of 3, Staple Inn, Holborn, W.C., is making arrangements for the manufacture of permanent magnets of all kinds in this country, and he invites inquiries.

Catalogues and Lists.—Messrs. Townshend's Art Metal Co., Ltd., Ernest Street, Holloway Head, Birmingham.—28-page catalogue illustrating and giving prices of a number of excellent lines in electric light fittings. These include a variety of neat bracket fittings (polished brass and other finishes), single and double arm, and for lamps or electric candles; hall lanterns, table standards, electroliers, with either ordinary shades or large bowls and reflectors, bedroom pendants, cord and shade pendants. The catalogue should be of additional interest now that most imports of foreign electric light fittings are stopped.

The Sturtevant Engineering Co., Ltd., 147, Queen Victoria Street, London, E.C.—24-page well-illustrated pamphlet very fully describing the Sturtevant system of drying. Copies can be obtained on application.

The New Lighthouse Radiator Co., 4, St. Mary Axe, London, E.C.—Illustrated price leaflets relating to their electric kettles, stoves, radiators, saucepans, and cookers.

Messrs. British Insulated & Helsby Cables, Ltd., Prescot.—Illustrated circular describing the Prescot pillars fitted with H.T. porcelain-insulated cable units.

The Consolidated Pneumatic Tool Co., Ltd., 9, Bridge Street, Westminster, S.W.—48-page illustrated catalogue of electric tools—drills of various kinds, portable tool post, twist drill grinders, coal and ore boring machine, electric hammers, electric blowers and sand shakers, couplings for connecting cables, &c. These tools are made at the company's factory at Fraserburgh, Scotland, an inside view of which appears in the pamphlet.

Messrs. Pooley & Austin, 25, Victoria Street, London, S.W.—Illustrated leaflet giving prices and particulars of their "Panda" electric light generating sets (British-made) for use on board yachts and in bungalows or small country houses.

The Langdon-Davies Motor Co., 110, Cannon Street, London, E.C.—16-page illustrated pamphlet fully describing their standard A.C. motors of short-circuited rotor and slip-ring types; also a 16-page price list of single-phase (40 to 125 periods) and polyphase (25 and 50 periods) motors.

Norway.—H.M. Consul at Christiania (Mr. E. F. Gray) reports that an electrical engineer in that city wishes to secure the agency for Norway of United Kingdom manufacturers of general electrical goods. Apply to Commercial Intelligence Branch of the Board of Trade, London, E.C., for name and address. Further communications to the British Consulate, Christiania.

Grinding Paste.—Messrs. Weston & Co., of 47, Minories, E.C., have sent us a sample of their grinding paste, for grinding in leaky valves, &c., a British-made article, for which exceptional qualities and saving in time and labour are claimed. The makers are willing to send a sample tin to any firm that is interested.

Commutators with Moulded Insulation. — Referring to the note in our issue of the 11th instant, the United States Light and Heating Co., of 17, Conduit Street, W., inform us that they control the rights for manufacturing this class of commutator in European countries, the construction being covered by several patents. If any British firms are interested in this commutator, the company will be glad to supply particulars and to show them samples of commutators so made. They say that they not only obtain 100 per cent. good commutators with this construction, as against 89 per cent. with the old style of manufacturing, but obtain this result with practically 40 per cent. reduction of the cost of the old method, and the commutator is both lighter and in every way superior to the old type. The full benefits of this construction of commutator can only be obtained with quantity production.

Bankruptcy Proceedings.—Archibald Atkinson, 30, Great George Street, Leeds, cycle and electrical engineer.—The first meeting of creditors herein was held last week at the Official Receiver's office, 24, Bond Street, Leeds, when the statement of affairs showed ranking liabilities of £57, to meet which there were assets of £10. The failure was ascribed to lack of business experience and bad trade. No resolutions were passed.

Trubie Moore, electrical engineer, 75, Headingley Mount, Kirkstall Lane, Headingley, Leeds.—The public examination of this debtor took place at the County Court House, Albion Place, Leeds, last week, when Mr. Registrar Gillespie ordered the case to stand adjourned.

Dissolutions and Liquidations.—Electric Flashlights, Ltd.—A meeting of creditors will be held at 20, John Street, Adelphi, on October 16th, to hear an account of the winding up from the liquidator, Mr. R. G. Sidford.

Lumen Fittings Co., Ltd.—A meeting of creditors will be held at Messrs. Flint & Thompson's offices, 71, Temple Row, Birmingham, on October 15th, to hear an account of the winding up from the liquidator, Mr. G. W. L. Thompson.

Mordey-Fricker Electricity Meter Co., Ltd.—Referring to a previous notice which has been published, we are informed that this company, having sold its patents and business to the British Insulated and Helsby Cables, Ltd., has gone into voluntary liquidation, simply to wind up the business. The advertised meeting of creditors was called only to comply with a legal formality, there being no creditors.

Trade Announcement. — The new name of the Schniewindt Electric Co. is the Cressall Manufacturing Co., not the Cressall Electric Co., as already announced.

LIGHTING and POWER NOTES.

Ashton-under-Lyne.—Loan Sanction.—The L.G.B. has sanctioned the borrowing of £42,000 for extensions to the electricity works.

In connection with the extension of the Cavendish Street mills for Messrs. Reyners, Ltd., the blowing-room machinery is to be driven by electric motors.

Aylesbury.—Cables.—The U.D.C. has postponed the acceptance of the tenders for cables and the erection of the E.L. station owing to difficulties in obtaining a loan on favourable terms.

Barrow.—The borough electrical engineer has been authorised to obtain an electrically-driven air compressor for the purpose of keeping the electrical machinery free from dust.

Bolton.—Loan Sanction.—The L.G.B. has sanctioned the borrowing of £1,463 by the Corporation Electricity Committee in connection with the new Back-o'-th'-Bank power station.

Brymbo.—L.G.B. Inquiry.—The application for a loan of £300 for the provision of lamp-posts, &c., for public lighting by electricity will shortly form the subject of an inquiry.

Chippenham. — Overhead Lines. — The T.C. has granted an application by the E.L. Co. to use overhead lines to give an immediate supply of current to the signal works of Messrs. Saxby & Farmer, Ltd. The company has also been granted permission to erect an experimental light in the town.

Cleckheaton.—L.G.B. Inquiry.—An inquiry was held last week into the application of the Council to borrow £2,200 for the purposes of the electricity works. The loan was required for the provision of a storage reservoir and a new switchboard. There was no opposition.

Dewsbury.—Annual Report.—The annual accounts of the Corporation electricity undertaking for the year ended March 31st last, show a gross profit of £5,781, out of which £4,300 was placed to the sinking fund, &c., £500 to the renewals fund, and a similar amount to the relief of the rates, leaving a balance of £984, as compared with £536 in the previous year.

Dover.—Bulk Supply.—The Electricity Committee last week considered the offer of the S.E. Electricity Supply Co. to supply power in bulk from the power station at Tilmanstone Colliery. The price quoted was ¾d. per unit for a million units, with reductions for larger quantities to ·74d. and ·72d. The Committee decided that it did not at present see its way to incur the capital expenditure which an alteration of the system would entail.

Droylsden.—Street Lighting.—A Sub-Committee has been appointed to consider the question of lighting the public streets on Fairfield Estate by electricity.

Dundee.—Bulk Supply.—The Electricity Committee has refused the application of the Tayside Electricity and Gas Co. for a bulk supply of electricity for distribution in Wormit, as it would involve an expenditure of £3,000 for cables. The Committee decided to offer a supply of current in Dundee, leaving it to the company to convey it across the River Tay.

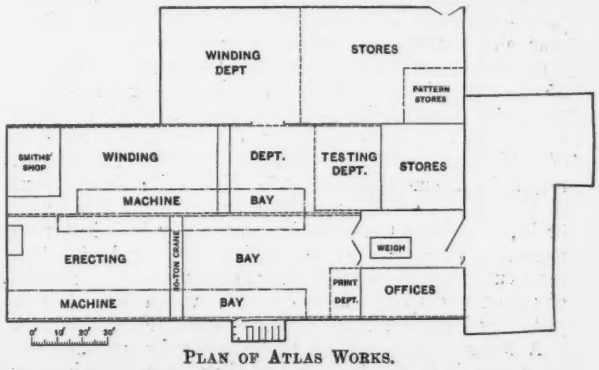
Greenock.—Annual Report.—There is a credit balance of £3,473 in the Corporation electricity department, and this has been placed to the reserve fund, which now amounts to £16,000.

Hemsworth.—Prov. Order.—The R.D.C. has decided to support the application of the Yorkshire Electric Power Co. for E.L. powers for the district.

(*Continued on page* 404.)

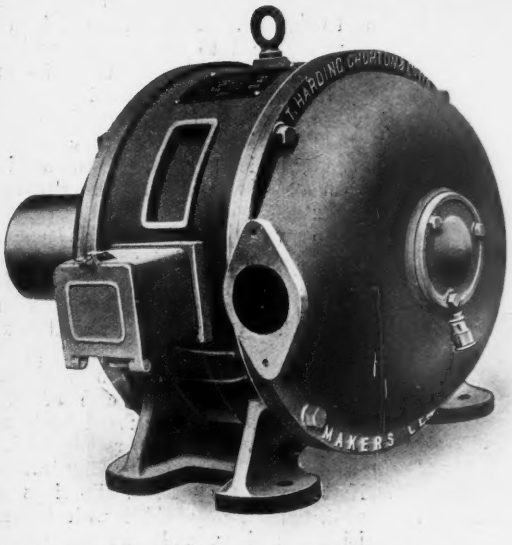
THE WORKS OF MESSRS. T. HARDING CHURTON & CO., LTD., LEEDS.

The virtues of specialisation are well exemplified by the history of the manufacturing business established by Mr. T. Harding Churton at Leeds in 1897. Commencing with direct-current generators and motors, Mr. Churton saw his opportunity when the master-patent of the induction motor expired—and seized it. Thus, in 1902 he began the manufacture of A.C. induction motors, and soon devoted almost his whole attention to this subject; the Corporation of Leeds at that time was just about to commence the supply of two-phase current, and Mr. Churton was already building the motors before the new system was inaugurated. Some of his earliest machines are running in Leeds to-day, and giving satisfaction. About eight years ago, the business having prospered, it was transferred to the Atlas Works in Water Lane; the site is conveniently situated near the centre of the city, and affords ample facilities for extensions. In 1912 the conversion of the firm into a limited company marked a further stage in the development of the concern. The company has a London office at 52, Queen Victoria Street, E.C. Mr. Churton for some time has devoted much attention to Canadian trade, and has traversed the Dominion from end to end on three occasions during recent years; by personal investigation he was thus enabled to cultivate the Canadian market, in which his motors have proved very successful, being able to compete with and beat the American-made motors as regards both efficiency and power factor.



Plan of Atlas Works.

Erecting and Machine Shops in Messrs. Churton's Works.



Pipe-Ventilated Motor, with Ball Bearings.

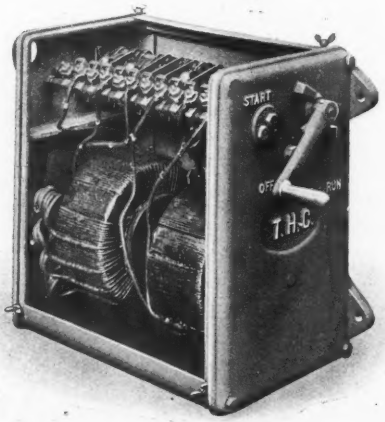
The Atlas Works, as altered and adapted by Mr. Churton, lend themselves admirably to the purposes of motor manufacture; as shown in the accompanying plan, the material undergoes little unnecessary handling in its progress through the shops, the general trend of motion being from the stores through the erecting and machine bays, returning through the winding department, and so arriving at the test bed, whence the machines pass into the finished stores or the shipping department. The erecting bay is served by a travelling crane capable of lifting 30 tons, and a smaller crane serves the winding department. A railway runs from the erecting bay through the testing department.

E

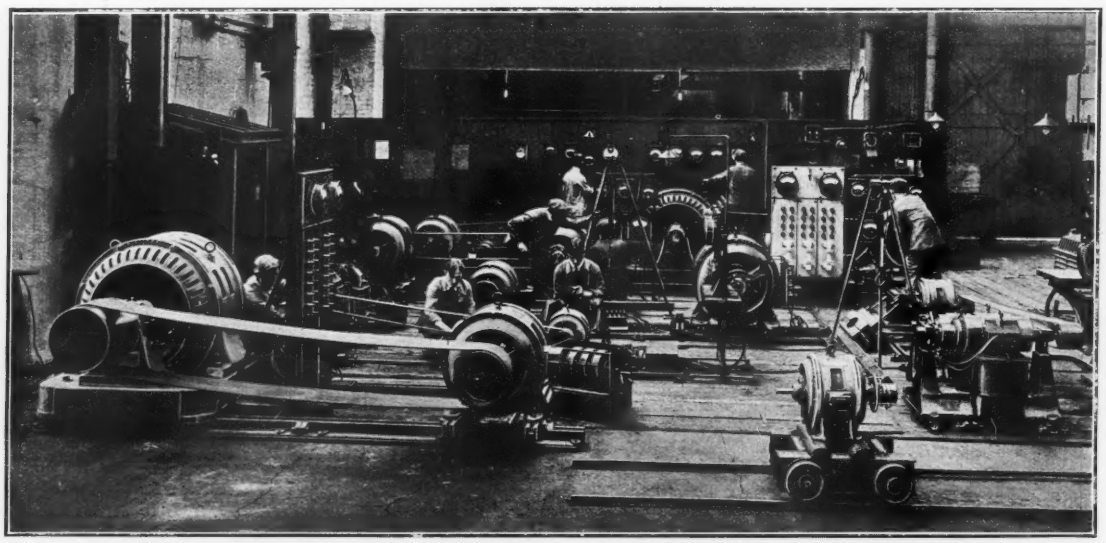
Power is obtained from the Leeds Corporation mains, both for driving the shafting and for the operations of the testing department. The equipment of the latter, comprising motor-generators and exciters, and a variety of switchgear and instruments, enables a supply of one, two or three-phase current to be obtained, at any frequency from 25 to 60 cycles per second, for two-phase or three-phase, and up to 100 cycles, single-phase, and any pressure up to 4,000 volts. In view of the difficulty of getting steady readings of speed with a Prony brake, an ingenious method is employed, resembling the method of "double weighing"; simultaneous readings are taken of torque and current with the Prony brake, an easy matter, and then the motor is belted to a generator which is used to provide a steady load. The same current readings as before are then reproduced, and the corresponding speeds are observed, which can then be plotted against the brake loads observed in the first series of tests.

A severe test is applied to the motors by running them on a circuit at double their normal pressure, whereby they are quickly heated up to or beyond their normal full-load temperature; the motors are then run for a time on full load, and the temperature is observed at intervals. Obviously it is easy by this means to ascertain the final temperature attained on continuous running at full load, in the minimum of time.

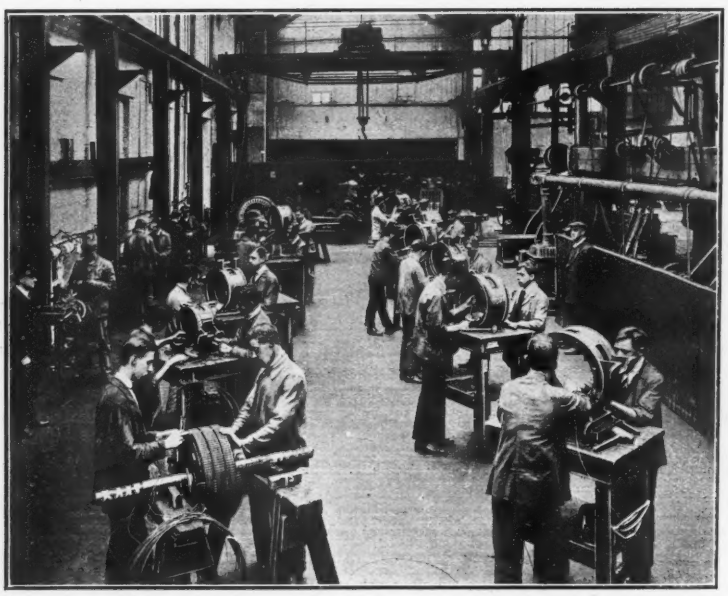
A special feature of the motors is the high efficiency and power factor obtained over a large range of load, due to the use of partially-closed slots on both stator and rotor. This necessitates hand winding, which is carried out with great care, with a view to ensuring reliability in service. The d.c.c. wire is impregnated with varnish in a special oven and waxed before use, to facilitate the winding process, and the end connections of the coils are afterwards carefully taped and varnished. This system enables any individual coil to be repaired without affecting the rest, though repairs are rarely called for, and partly for this reason the company has not adopted the practice of impregnating the coils after winding, which has the effect of making them a solid mass and rendering rewinding extremely difficult. Inside the slots, for low voltages, presspahn and empire cloth tubes are used for insulation; for high voltages and for motors destined for tropical climates micanite tubes are employed. Convenient terminal boxes are provided on the machines, and the mains are brought into them in steel conduit, except in the case of high pressures, when the insulated leads are brought out through porcelain bushes, as shown in one of our illustrations. Neat covers for external slip rings are used, which are provided with bayonet joint fastenings, and can be quickly



Drum-Type Auto-Transformer Starter.



Test Bed at Atlas Works.

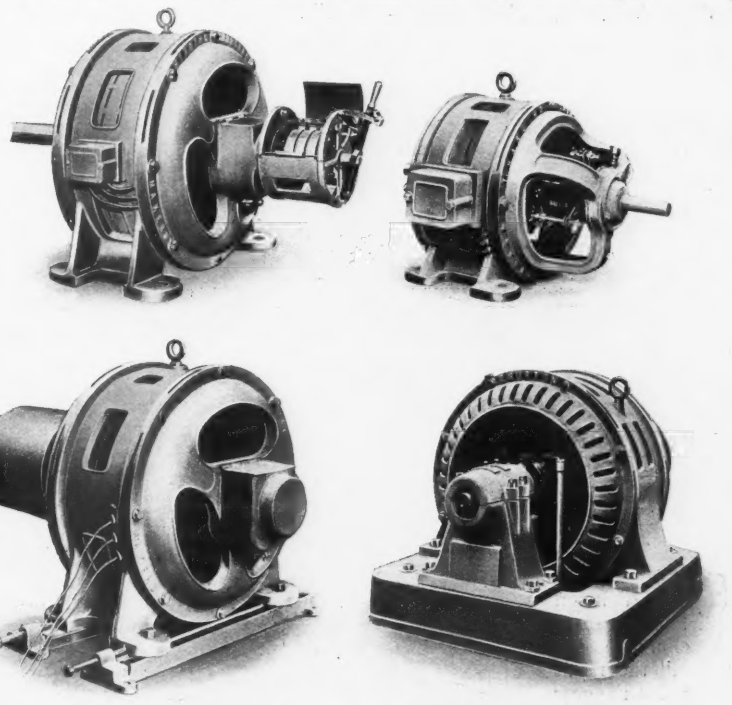


No. 1 Winding Bay.

removed. The slip rings are either internal or external as ordered, both types being here illustrated ; a neat device for short-circuiting the rings and lifting the brushes by means of a lever on the end of the machine is also shown.

Ball bearings are very freely used and often recommended, but sleeve bearings with oil-ring lubrication are also fitted ; no trouble has been experienced with the ball bearings, mainly because special care is taken to apply them in the proper way. All parts are made interchangeable, jigs and limit gauges being used to ensure accuracy of workmanship.

Amongst recent additions to the apparatus made by Messrs. Harding Churton's works are pipe-ventilated motors, and totally-enclosed auto-transformer starters for motors with short-circuited rotors. The former, which we illustrate, are fitted with ball bearings, and fan blades on the rotor, which are equally effective in either direction of rotation. The terminal boxes have hinged covers, and are arranged for screwed-conduit connections. The starters are of the drum type, with renewable contact fingers and tips, and the insulation is of micanite throughout. The starters are mistake-proof ; the operating handle cannot be left in the starting position, nor can it be moved to the running position except by being quickly thrown over from the starting position. The transformer connections are conveniently accessible, and the coils are provided with a series of tappings giving from 40 to 75 per cent. of the line voltage for starting. We illustrate one with the cover removed on p. 400. A similar starter is made with the drum below the transformer, and immersed in oil in a tank which is easily removed.



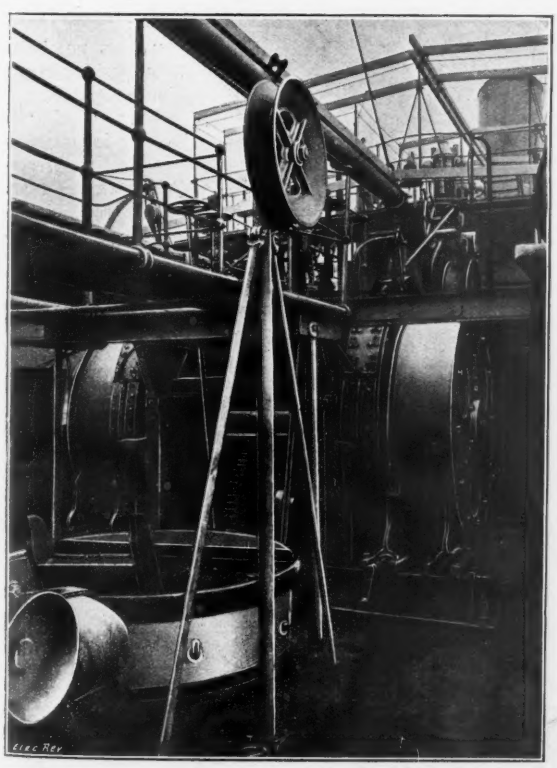
100-h.p. Motor with Short-Circuiting Device.

Three-Phase Motor with Internal Slip-Rings and Ball Bearings.

High-Voltage 150-h.p. Squirrel-Cage Motor.

Three-Phase Synchronous Motor, 150 h.p.

Some Churton Motors.



Cable Gear of the C.S. "Transmitter" looking Aft.

The progress of work through the shops is controlled by a simple system of cost cards, which involves no superfluous work, and is easily operated by one clerk, who also works out the costs, time sheets and wages, and analyses the data so as to show at a glance the cost of each item. By this means any excess of expenditure on a particular part or type of machine is readily detected and remedied, and scope for improvement in design is made apparent.

Amongst the larger customers of the company are various Government departments, as well as Sir W. G. Armstrong, Whitworth & Co., the Great Western Railway, Leeds Corporation and other public bodies. Mr. Churton's American tours have also brought large orders from Canada and the United States, and the company has agents in several of the over-sea Dominions and in Mexico.

A NEW CABLE-REPAIRING STEAMSHIP.

Although not by any means the largest, undoubtedly one of the most interesting ships specially designed and equipped for the laying and repairing of submarine cables is the single-screw steamer *Transmitter*, which has recently been added to the fleet of the Eastern Telegraph Co., Ltd.

The *Transmitter*, built by the Goole Shipbuilding and Repairing Co., Ltd., is 221 ft. 4 in. in length overall, 30 ft. in breadth, moulded, 17 ft. 6 in. in depth, moulded, and has a gross tonnage of 903 tons. The vessel is classed in Lloyds' Registry 100 A1 with special survey, but many of the scantlings and parts exceed Lloyds' requirements.

The *Transmitter* is designed to carry a crew of 55 ; the captain's quarters are on the bridge deck, and comfortable well-fitted accommodation for the officers, electricians and engineers is provided on the main deck. On the lower deck aft of the engine room is the engineers' workshop. On the forecastle bridge and main deck the most modern appliances are provided for the delicate and difficult services of laying and repairing submarine telegraph cables. This equipment comprises a steam cable machine, two dynamometers, turning-over gear and bow sheaves and a Lucas sounding machine.

The cable gear, constructed and installed by Messrs. Johnson & Phillips, Ltd., is claimed to be the most highly-finished machinery of its class fitted on any cable steamer. Every gear wheel, even the large gears on the main drums which have 70 teeth of 3¼-in. pitch, is machine-cut from

the solid, all the larger wheels being of cast-steel, while the pinions are of Immadium bronze.

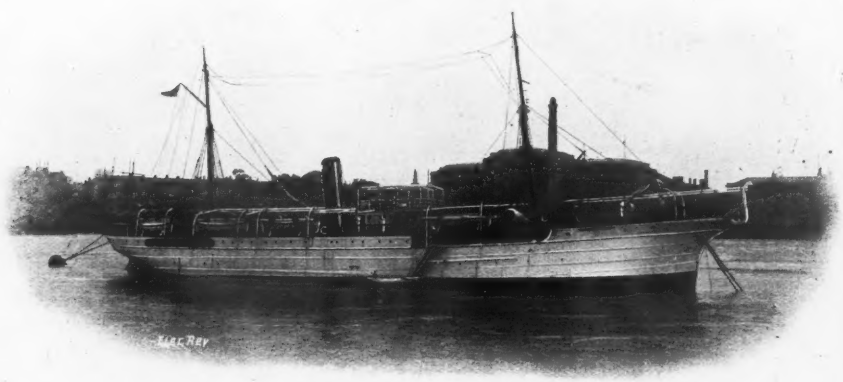
Several of the steel wheels were "muffled" in accordance with a suggestion of Messrs. Johnson and Phillips, so as to eliminate the "ring," the result being that the gear works with a minimum of noise and rattle. The cable gear is a combined picking-up and paying-out machine having two drums, but with one engine, the drums being independent of one another, so that while one is picking up the other can be paying out under control of the brake. The drums run loose on the drum-shaft, which is a fixture in the frames, making a very rigid job. They are internally geared, and are connected to the second-motion shaft by machine-cut bronze pinions which are carried on a shaft in special pocket bearings attached to the main frame, and so constructed that the pinions can slide into gear through large holes in the frames, making a very compact job.

The engine is coupled to the first-motion shaft by means of machine-cut bevel gear. The drum pinions and the speed wheels are slid into gear by means of wipers actuated by worm gearing and hand-wheels from the platform deck above. All the controlling mechanism is arranged on the top deck, the steam stop valve, reversing lever, main brakes, and holding-back gear brakes, all being within arm's reach of the attendant.

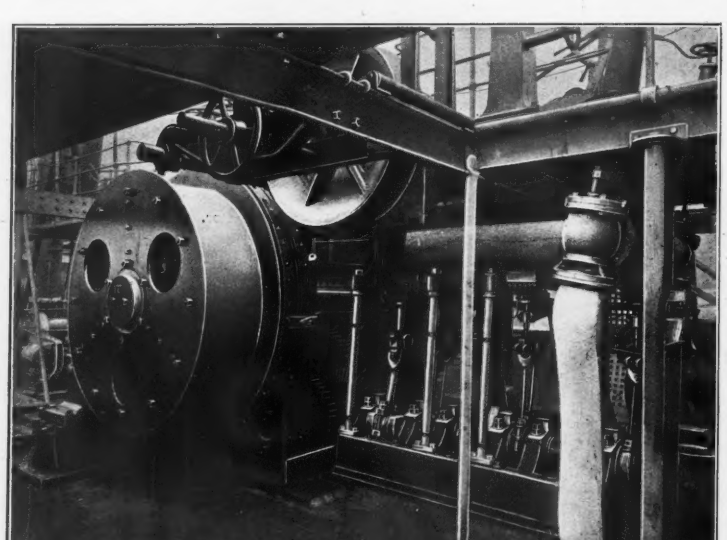
The drums are 5 ft. 8½ in. in diameter on tread by 1 ft. 7 in. wide between the flanges, and they are geared for two speeds, for nominal lifts of 15 tons at one knot, and 6 tons at three knots, but the engine is a very powerful one, having three cylinders 11½ in. in diameter by 13 in. stroke, thus enabling the gear to deal with any lift that it may be called upon to do. Evidence of this was given while the lift tests were being made, the load of 15 tons being picked up with great ease, and the valve gear is so adjusted that it is possible to haul up quite steadily even a few inches.

Each drum is provided with a large brake ring, encircled by a brake band consisting of steel straps fitted with elm blocks, and on the back of each strap a water service pipe is attached having small nozzles at intervals to allow the water to be delivered equally all round the brake ring, so as to permit of paying out fairly long lengths of cable.

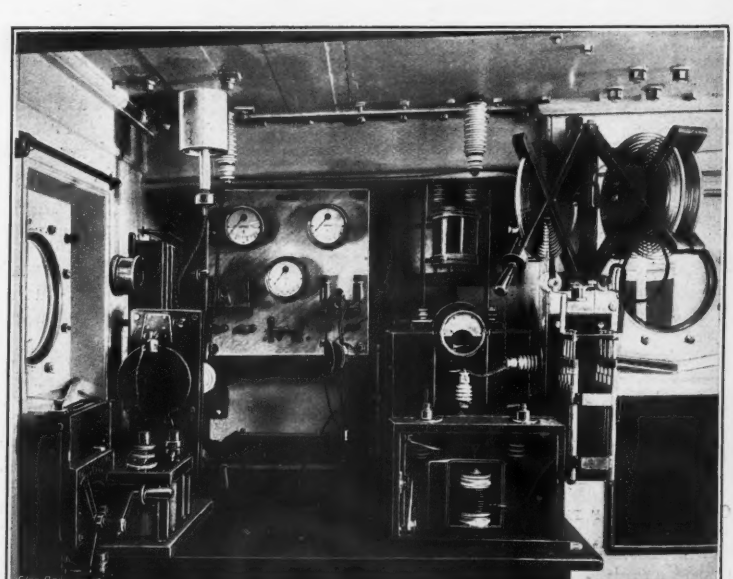
Some brief outline of the *modus operandi* pursued in repairing submarine cables, for which the *Transmitter* has been specially designed, may not be without interest. First, the electrician determines, by means of careful electrical measurements taken from the shore, the position of the fault in the cable. The ship then proceeds to the spot and places a mark-buoy as nearly in that position as can be estimated, and whilst waiting to verify it by astronomical observations, she takes a series of soundings so as to deter-



THE NEW C.S. "TRANSMITTER."



CABLE GEAR, LOOKING FORWARD.

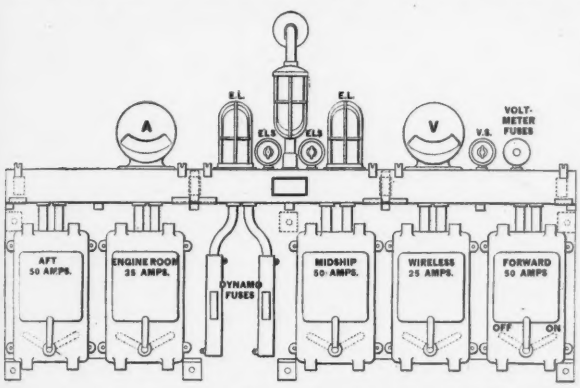


WIRELESS TELEGRAPH INSTALLATION.

mine accurately the depth and nature of the bottom in the neighbourhood of the buoy, where the grappling work will have to be done.

The soundings are taken with a wire sounding machine. The Lucas machine, for depths up to 5,000 fathoms, is fitted with a grooved wheel for driving by a rope from a steam winch or other engine. The wire of the sounding machine is on a cast-steel drum, and as it is paid out passes over a measuring wheel, the revolutions of which record on a dial the number of fathoms out; when the sinker strikes the bottom the loss of tension allows a brake to spring back and stop the reel, and the depth can then be read off on the dial.

On obtaining the latitude and longitude by observation, it may be found that the mark buoy is some distance from



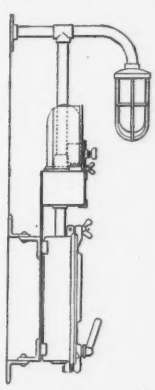
IRONCLAD MAIN SWITCHBOARD, C.S. "TRANSMITTER."

the line of cable, in which case a second buoy is placed exactly on the line, and the bearings of both buoys are used in order to determine the courses made whilst grappling. The ship now proceeds to the position for lowering the grapnel, which is usually about a mile from the line of cable, and she then steams very slowly across the cable. The speed of grappling should never exceed one mile per hour, and in deep water it is often advantageous not to go at more than half this speed. The ship is sometimes allowed to drift with the wind or current when these are favourable and across the line. After the cable has been hooked and raised to the surface, it is cut, and the ends are taken on board the repairing ship. Electrical tests are then made to ascertain towards which shore the fault lies, and how far from the ship it is. As soon as this is known, a chain is attached to the good end, and it is left hung up to a buoy, whilst the ship proceeds to pick up the cable towards the fault, cutting it and testing from time to time in order to see whether the fault has come on board. As soon as this proves to be the case, new cable, which has been stored in one of the cable tanks on board the ship, is spliced on to the end of the cable which is being picked up. This is then paid out over the bow sheave in the direction of the buoy. This operation completed, the end of the cable hung up is taken on board, the two ends are spliced together, and the bight is carefully lowered to the bottom.

Several types of grapnels are used, according to the varied conditions of the bottom, but, perhaps, that most frequently used is the centipede pattern. The grapnel is made in two sizes—the larger weighing about 2 cwt., and the smaller 1¼ cwt.—and it has the advantage of being of strong construction and not easily broken on rough ground. It hooks the cable securely, and if a prong does get broken through hooking a rock, the damaged prong is easily replaced. The grapnels are regularly kept very clean, and painted grey, as a speck of tar on the grapnel affords the most important evidence that a cable has been broken.

In the lifting of an old cable which is in a very weak condition, it sometimes becomes necessary to hang it half way up on a bight buoy, and then to hook the cable a second time between this buoy and the broken end, so that the cable may be lifted to the surface without putting the whole weight of it on one grapnel. It is, however, more usual to utilise the Lucas cutting and holding grapnel, which is designed to hook the bight of a cable, to cut and drop one end, and to grip and raise the other end to the surface. It is dragged over the bottom, and when the cable has been hooked the bight is raised until it becomes tight; the strain then breaks the bolts which keep the arms extended, and the tension on the wire rope causes the arms to fold down on to the shank, gripping the cable on one side and cutting off the other.

The refrigerating machine was supplied by Messrs. J. and E. Hall, Ltd., of Dartford; it is one of their steam-driven combined CO_2 type, and forms a very compact and complete unit. There are two large refrigerating chambers, for the preservation of meat and vegetables, in the after-hold, with a complete system of brine piping carried from the ice machine. The electric light installation is a very comprehensive one, and was carried out by Messrs. Clarke, Chapman & Co.



The engine is of the open marine type, coupled to a compound-wound dynamo, with an output of 100 amperes, 100-105 volts, when running at a speed of about 350 R.P.M. The contract also included the supply and erection of the main switchboard, cables, wiring, &c., for 235 points and 226 lights, and 15 fans, as well as the masthead light, three cable lanterns, and one Morse signalling lantern on the masthead, the last being of Wightman's patent type.

The deck machinery includes a powerful windlass, manufactured by Messrs. Emerson, Walker & Thompson, which is fitted on the forecastle deck. There is a combined steam and hand steering gear, manufactured by Messrs. R. Roger and Co., Ltd., which is fitted within the poop, and is controlled by a system of rods and a wheel from the navigating bridge.

Inclusive of a steam launch, there are eight boats. The launch is designed for towing cable lighters, &c., and other hard work at sea.

The wireless telegraph installation was manufactured and erected by Messrs. Siemens Bros. & Co., Ltd., Woolwich, upon the quenched-spark system. The adoption of this system has made the building of a special cabin and spark gap chamber unnecessary upon the *Transmitter*, the quenched-spark installation being practically noiseless. Another advantage claimed is that, the note emitted being musical in character, the station can be heard even when natural electrical discharges are as much as 10 times as intense. The source of energy of the installation is a motor-generator set consisting of a direct-current motor of about 1½ H.P., driving an alternating-current generator of 1-KW. output at 220 volts, 500 frequency. The speed of this motor can be adjusted over a range of about 30 per cent. of the normal speed for the purpose of adjusting the pitch of the note transmitted.

This motor-generator set is installed in a "spark room," and the necessary leads run from there to the wireless telegraph apparatus proper, which is situated in the cable testing room. The alternating current from the generator is stepped up from 220 volts to 8,000 volts by means of an iron-core transformer. A choking coil is provided in the low-tension circuit in order to obtain the necessary resonance between the low-tension and excitation circuit. The excitation circuit consists of an iron-cased condenser with glass dielectric and oil insulation, an inductance of copper strip and a quenched spark gap. The latter consists of a number of silver faced copper plates separated by mica rings. The whole excitation circuit is enclosed in a wooden case, upon the back of which is provided a hot-wire ammeter. Slots are cut in the top of this case through which plugs are fixed in sockets corresponding to the positions required upon the inductance for the 300 and 600-m. wave lengths. Connections are made from these plugs to an inductance of the variometer type which serves to obtain the correct resonance between the excitation circuit and the aerial. The receiver is of the Siemens Telefunken type; the detectors, two of which are mounted upon the receiver, are of the contact type. The coupling of the primary and secondary coils of this receiver is capable of very large variation; the wave length of the receiver is from 200 to 2,000 m.

In order to prevent damage to the detectors and receiving apparatus during transmission a special form of switch is provided at the back of the receiver, which ensures that transmission cannot take place until all the receiving circuits are broken by means of this switch. The ranges over which this station will work have been guaranteed as 150 nautical miles by day and about 250 miles by night, but from the previous experience of Messrs. Siemens it is expected that the actual working range will be greatly in excess of these figures.

The testing room, which is of large dimensions, is, of course, the principal apartment in the vessel, for it not only contains the delicate instruments by which the condition of the cable in the vessel's tanks is tested from time to time, but also it is the speaking and sending place of service messages to the head office and the station on whose cable the vessel may be working at the time.

As the *Transmitter* will be required to work in tropical climates, special consideration was given to the lighting and ventilation of the various apartments and machinery spaces. Two sidelights and separate ventilator cowls are fitted to each cabin, whilst the workshop, lower deck and crew space are all well lighted and fitted with large ventilator cowls, and all of the ventilators are carried well above the weather deck. Double canvas awnings are fitted from stem head to stern.

The propelling machinery consists of triple-expansion engines supplied by Messrs. Richardsons, Westgarth & Co., Ltd., and on the official trials, which took place off the Humber, a mean speed of 11·2 knots was obtained. The hull and machinery of the *Transmitter* were built to the specification, and under the direct supervision, of Mr. P. L. Isaac, the superintending engineer of the Eastern Telegraph Co., Ltd.

After having completed four repairs to cables between Porthcurnow (Cornwall) and Vigo, the *Transmitter* left the Thames for the West Coast of Africa on May 23rd last.

LIGHTING and POWER NOTES.

(*Continued from page* 398.)

Hexham.—The 1906 electric light extension order has been revoked.

Keighley.—L.G.B. Inquiry.—An inquiry was held recently into the application of the Corporation to borrow £16,700 for the electricity undertaking.

Kelso.—Proposed E.L.—Negotiations are in progress between the T.C. and the local gas company regarding a proposed electric lighting scheme for the town.

Little Crosby.—New Power Station.—The Hightown Gas and Electricity Co. has applied to the B. of T. for consent to erect a generating station in St. George's Road, Hightown.

London.—St. Pancras.—Reserve Fund, Loans, &c.—The B.C. is recommended to write off, out of the electricity reserve fund, the sum of £1,422 from the electricity capital account, being the outstanding balance of the cost of copper strip mains removed from three streets. Application is to be made for sanction to borrow £8,969 in respect of expenditure on the electricity capital account to March 31st next. The County Council has sanctioned the borrowing of £22,530 for the provision of four boilers at the King's Road station. The Finance Committee recommends the utilisation of £13,000 from the electricity profits towards the relief of the rates during the winter half-year.

Stepney.—Bulk Supply.—The B.C., owing to the war, has been unable to obtain delivery of turbo-generators, upon the installation of which the bulk supply of current to Shoreditch depended. Under the circumstances, and as a temporary expedient, the Shoreditch B.C. is recommended to approve the offer of the Stepney Council for a limited supply up to 600 or 700 kw. at an increased price per unit during the four hours of peak load, the contract price being chargeable during the rest of the 24 hours.

Shoreditch.—Year's Working.—The accounts of the electricity undertaking show an increased revenue over the previous year of £4,836. The expenditure has increased by £3,588. The surplus for the year, after meeting all charges, &c., is £4,715, which, with the balance brought forward (£54), makes a total of £4,769. The Lighting Committee proposes to dispose of this balance in the following manner:—In relief of rates, £1,500; to reserve fund, £2,500; to change of pressure account, £133; to conversion of gas lamps, £515; balance carried forward, £120. The current generated from destructor steam during the period under review amounted to 781,016 units, for which the department has paid £1,592, in addition to £400 for standby.

Penistone.—Workhouse Lighting.—With reference to the E.L. scheme for the Workhouse, the L.G.B. has informed the B. of G. that it will send an engineering inspector to visit the institution.

Pontefract.—Prov. Order.—The R.D.C. has decided to take no action regarding the application for E.L. powers by the Yorkshire Electric Power Co.

Sheffield.—At the last week's meeting of the City Council it was agreed to appoint Mr. Fedden manager, and Mr. Yerbury deputy-manager, of the combined electric supply and tramways power stations. The arrangement reduces the staff by one, and saves £400 a year in salaries.

Shepley.—Prov. Order.—The U.D.C. has decided to support the Yorkshire Electric Power Co.'s application for lighting powers, provided it does not create a monopoly.

Southampton.—The T.C. has received permission to supply energy in South Stoneham, outside the area of supply. The electrical engineer reports that the self-contained electrical installation at the baths, shows considerable signs of wear, and that the wiring installation is defective; the Baths Committee has decided to in future take the current for the lighting of the building direct from the town supply, and has directed the engineer to carry out the overhauling and renewal work.

South Wales.—Power Co.'s Progress.—In connection with the bulk supply scheme for Merthyr, which was inaugurated early this year, it may be of interest to note that the South Wales Power Co. is also giving bulk supplies to the Mountain Ash U.D.C., at Ynysybwl, to the Llandaff and Dinas Powis R.D.C., at Whitchurch, to the Radyr Electric Co., at Radyr, to the Mardy Electric Light Co., at Mardy, and to the Rhymney Valley and General Electric Supply Co., at Bargoed, and that a special agreement has been entered into with the Rhondda Council under which supplies of electricity will be taken from the Power Co.'s mains in bulk by the Council for lighting and general purposes, and under which the Council supplies electricity in bulk from refuse destructors to the Power Co. In addition to these supplies, the Power Co. itself holds a prov. order in the Caerphilly Urban District, covering Abertridwr, Senghenydd, Llanbradach, Taffs Well and Nelson. The supply is already being given in the four first-named places, and arrangements are in progress for giving a supply at Nelson, which, it is hoped, will be in operation during the present year. The Power Co. is also supplying electricity under a prov. order in the parish of Llantwit Fardre, and holds a prov. order for the Urban District of Abercarn, &c. The company has already installed and working two 6,000-H.P. turbo-alternators, and has in process of erection another set capable of developing 10,000 H.P. Two large new Babcock & Wilcox boilers, with special induced draught arrangements, Green economisers, and superheaters have also recently been installed, and are at work, and the total equivalent in I.H.P. available in the power station is about 30,000. The greater part of the Power Co.'s business at present consists of supplies to collieries and other industrial enterprises, some of the principal among which are the following:—Great Western Colliery Co., Ltd., at Penrhiw and Maritime, Tymawr, Gyfeillon, and Cwm new sinkings; Albion Steam Coal Co., Pontypridd; Windsor Steam Coal Co., Abertridwr; Lewis Merthyr Collieries, at Trehafod, Lady Lewis and Senghenydd; Locket's Merthyr Collieries, at Mardy; Newport Abercarn Steam Coal Co., at Celynon; Rhymney Iron Co., Ltd., at Pengam and Groesfaen Pits; D. Davis and Sons, Ltd., Bodringant; Duffryn Llantwit Colliery, Elled Colliery, Pontypool; Mynydd Maen Colliery, Pontypool; Baldwin's Albion Road Colliery, Pontypool; Mr. Thomas Taylor's Pit at Darranddu, and the new sinkings at Nantgarw; Redbrook Tinplate Works, Pontnewydd; Melingriffith Steel Works, Whitchurch; and Baldwin's Steel Works, Panteg.

Sutton.—The U.D.C. has sent to the B. of T. formal objection to the application of the County of London Electric Supply Co. for an order authorising it to supply current in bulk to the South Metropolitan Electric Tramway and Lighting Co., Ltd.

Swansea.—The Education Committee has decided to have the work at the Training College Hostel laundry done by electrical power, and has instructed the borough electrical engineer to provide the necessary plant, &c. Two main feeder cables are to be laid to the centre of the town at a cost of £600. The Electric Lighting Committee is prepared to wire the first hundred municipal houses to be erected at Town Hill at a charge of 7d. per week each house, exclusive of renewals, each house to include four lighting points.

Torquay.—L.G.B. Inquiry.—An inquiry was held on the 8th inst. into the application of the T.C. for a loan of £16,000 for electricity purposes; a further proposal to expend £500 for illuminating Princess Gardens, was deferred for the present.

Tynemouth.—The T.C. has been recommended to instruct the electrical engineer to wire the new premises of the local rifle club free of cost, and to make a net charge of ½d. per unit for current supplied. The Electricity Committee has empowered a sub-committee to make all necessary arrangements in connection with a communication received from the Newcastle Electric Supply Co., Ltd., advising the Council that it might be necessary for the Corporation to run the generating plant at the works during the coming winter.

Walsall.—New Loans.—The T.C. is applying to the L.G.B. for sanction to the borrowing of £23,595 for the electricity undertaking. The tariffs for all classes of supply are to be revised, and new charges will come into force in October.

Wolverhampton. — The Corporation Sewerage Committee has decided to undertake the electrification of the Hordern Road ejector station and the outfall works at a cost of £730.

York.—Overhead Wires.—The T.C. has applied to the B. of T. for permission to use overhead lines for the transmission of current in the areas of the Escrick, Flaxton and Great Ouseburn R.D.C.'s, at a pressure of 3,000 volts.

Cable Contracts.—The Electricity Committee reports that there has been a difficulty in obtaining quotations from certain firms for the supply of cables, and it has authorised the engineer to order the same, paying for them on delivery.

TRAMWAY and RAILWAY NOTES.

Astley.—It is stated that the South Lancashire Tramways Co. is to be approached with a view to inducing it to construct tramways through Astley, where extensive new coalfields are now being opened out. Connections could be formed with the company's existing lines at Leigh and Boothstown.

Coventry.—The tramways department's 'buses have been requisitioned by the Government for military purposes, and are to be sent to Aldershot.

Croydon.—The T.C. has approved an estimate (of £2,550) as the cost of constructing a short double line of tramway track in Selhurst Road.

Keighley.—The Tramways Committee has recommended the purchase of land in Utley, as a site for a trolley vehicle shed, and has decided to purchase two more trolley vehicles from the Cedes Electric Traction, Ltd., at a cost of £806 each.

Marsden. — The U.D.C. has decided to ask the Huddersfield Tramways Committee to meet a deputation relative to the latter's decision not to go beyond the New Inn with the tramway.

Oldham.—During the recent holiday week the tramway manager ran motor-'buses to Denshaw, and the receipts amounted to about 2s. 2d. per 'bus-mile. It is now intended to try a motor-'bus on this route to ascertain whether it will be profitable to run it in normal times.

Pontefract.—The T.C. has accorded its support to an application which is to be made to the West Riding Tramway Co. in connection with reduced tramway fares for workmen between Normanton, Castleford and Pontefract. The present system is said to discriminate in favour of the colliers.

South Africa.—Germiston (Transvaal) Traction Scheme.—The official opening of the Germiston railless traction system took place on August 19th without much ceremony. It was originally intended to have some kind of gala, similar to that which took place when the Boksburg system was inaugurated, but owing to the war the opening was very quiet, the Mayoress of Germiston performing the ceremony in front of the municipal offices, and a general invitation was extended to the townspeople to attend a reception at the Hotel Alexander. There are at present six cars available, and four are yet to arrive, but the South African Railway Administration has been unable to guarantee delivery of these in consequence of extensive military movements. The system adopted is the Cedes-Stoll, the special feature being a flexible trolley which is kept automatically taut. The cars, painted grey, are fairly long, and the interior is neatly, though not luxuriously, furnished. The motormen had had ample opportunities to familiarise themselves with the routes, &c., and all passed off quite smoothly. The power is delivered from a sub-station containing two Peebles motor-converters, the A.C. supply being received from the mains of the Victoria Falls and Transvaal Power Co. There is much rivalry between Germiston and Boksburg—the latter's railless system not having proved a brilliant success.

York.—Tramway Extensions.—The Tramways Committee has given instructions for tenders to be obtained for the construction of the light railway on the Hull Road route as soon as the necessary plans and specifications have been prepared. The tramway manager has been instructed to report as to the equipment of the trolley vehicle routes authorised by the York Corporation Act, 1914, and to obtain quotations for the supply of motor-omnibuses. He has also been instructed to prepare a specification and obtain quotations for two electric 'buses, and to report on the equipment of the new tramway routes authorised by the same Act.

TELEGRAPH and TELEPHONE NOTES.

Cable Tariffs.—In reply to a question in the House of Commons, the P.M.G. stated that the Government were considering proposals which had been made by certain important cable companies for the reduction of cable rates during the continuance of the present prohibition of code messages.

Corea.—According to the latest returns, there are now 11,072 miles of telegraph wires and 29,577 miles of telephone wires in operation in Corea, an increase for the past 12 months, taking in both branches, of 2,352 miles.

Japan.—A wireless telephone service is shortly to be established between Kamishima, an island in the entrance to Ise Bay, and the adjacent port of Toba, to report the arrival of steamers bound for Yokkaichi and other ports in the bay.

Pacific Cable. — The Pacific Cable Board states that, as a result of the war, the cable is interrupted. As mentioned in our last issue, one of the German cruisers in the Pacific appeared at Fanning Island, under French colours, on the morning of September 9th, took possession of the cable station there, and cut off all communication. Every effort is being made to restore the ordinary service with as little delay as possible. In the meantime traffic for Australasia is being dealt with by the Eastern Telegraph Co.

Wireless Station Captured.—The Australian Naval Reserve forces captured the wireless telegraph station at Herbertshöhe, on the island of Neu Pommern, in the Bismarck Archipelago, on Saturday. The wireless tower and station were damaged by the enemy, and will be out of action for some time.

CONTRACTS OPEN and CLOSED.

OPEN.

Australia. — Sydney. — September 30th. Telephone instruments and parts, for the Postmaster-General. See "Official Notices" August 21st.

October 7th. Telegraph instruments, measuring instruments, incandescent electric lamps, switchboard parts, for the Postmaster-General. See "Official Notices" August 28th.

October 12th. Vacuum cleaning plant and motor-driven air compressor, for the Sydney Municipal Council.

Melbourne.—Victorian Railways Department. October 7th. Motors and switchgear, cables and motor-driven air compressors for the Ballarat and Bendigo workshops.

October 12th. Three-phase motors for workshop machinery, for Melbourne Suburban Railways. See "Official Notices" September 4th.

October 27th. Measuring instruments for the Postmaster-General.

Adelaide. — October 28th. Telephones and flexiphones, telephone instruments and parts, for the Postmaster-General. See "Official Notices" to-day.

November 4th. Telephone instruments and parts, for Postmaster-General. See "Official Notices" to-day.

Perth. — November 18th. P.M.G.'s Dept. 249 accumulators with assorted apparatus, for telegraph office, Norseman.—*Tenders.*

October 14th. Cable terminals for the Postmaster-General.

Brisbane. — December 15th. Switchboard, common battery, automatic or semi-automatic, for the Postmaster-General. See "Official Notices" to-day.

Birkenhead.—September 26th. E.L. plant, gas suction plant with dynamo and additional battery, &c., for the Clatterbridge Infectious Diseases Hospital, for the Wirral Joint Hospital Board. Mr. J. E. S. Ollive, Clerk, 54, Hamilton Street, Birkenhead.

Bolton.—September 28th. Telephone installation, Townley's Hospitals, Farnworth, for the B.G. Mr. John Ward, Architect, 24, Mawdsley Street, Bolton.

Burnley. — September 21st. Guardians. Electrical goods and the performance of electrical work during the next half-year.

Eccles.—September 21st. Coal elevator and conveyer at the electricity works, Cawdor Street, Patricroft. Specifications, &c. (£1 1s.), from the Borough Electrical Engineer.

Hornsey.—October 9th. Two rotary or motor converter sets, &c., for the T.C. See "Official Notices" to-day.

Limerick.—September 18th. Corporation. One three-cylinder Diesel oil-engine coupled to a 160-kw. D.C. generator; one motor-driven air compressor. See "Official Notices" September 4th.

London.—L.C.C.—September 28th. Installation, 215 wiring points, 285 lighting points, at Gifford Street Elementary School, Caledonian Road, N. See "Official Notices" September 11th.

September 22nd. Induced-draught fans, motors, spare parts and dampers, also alteration of flues and moving of dampers at the generating station, Greenwich. See "Official Notices" August 28th.

St. Pancras.—September 21st. Electric lift for heavy vehicles, for the B.C. See "Official Notices" September 11th.

Manchester.—October 6th. Supply of a car-wheel tire boring mill. Specifications, Mr. J. M. McElroy, General Manager.

South Africa.—Johannesburg.—October 9th. Ten single-truck double-decked electric tramcars, for Municipal Council. Specifications, &c., may be seen at Commercial Intelligence Branch of Board of Trade.

Spain.—Tenders have just been invited by the municipal authorities of Villalonga (Province of Valencia) for the concession for the electric lighting of the town during a period of 10 years.

Sunderland.—The T.C. has authorised the purchase of a motor-generator plant for the electric welding of the tramway track.

Wakefield.—One year's supply of rough slack (135 tons per week) for the Yorks. (West Riding) Electric Tramways Co., Ltd., Belle Isle.

Walsall.—September 29th. Corporation. Extra H.T. switchgear, static transformers, L.T. switchgear. See "Official Notices" September 11th.

Warrington.—September 22nd. The B. of G. invites tenders for six months' requirements of electrical goods, stipulating that no goods of German or Austrian origin will be accepted. Tender forms, Mr. Arthur Bottomley, Clerk, Bewsey Chambers.

September 29th. H.T. cable for the Electricity Department. See "Official Notices" to-day.

Whitby.—September 30th. U.D.C. Construction of cliff tramway or lift. Particulars from the Clerk to the Council.

Whitefield.—September 28th. Electric motors, centrifugal pumps, sewage ejector, sewage disposal works. Specifications, &c., one guinea. Mr. G. M. Denton, Engineer and Surveyor, Council Offices, Whitefield.

CLOSED.

Australia.—Sydney. The Corporation has placed with Messrs. Willans & Robinson, Ltd., a contract for a 5,000-kw. turbo-alternator set, with Dick, Kerr alternator. This is to take the place of a cancelled German contract. The matter is referred to in our "War Items" to-day.

With reference to the placing of a Council's contract for time switches with the British General Electric Co., Ltd, mentioned here last week, we understand that Venner time switches were specified.

Barnsley.—The T.C. has accepted the tender of the Manvers Main Colliery Co. for coal (nuts or small coal) for the electricity works, at 8s. per ton, a large decrease on last year's contract.

Bristol.—The Corporation Docks Committee has accepted the tender of Messrs. Troup, Curtis & Co. for electric cargo light fittings.

High Wycombe.—The Governors of the Royal Grammar School have accepted the tender for the Electric Light Co., at £170, for installing the electric light at the new schools.

Hounslow.—The following tenders have been received by the Heston and Isleworth Education Committee for an electrical installation at the new Alexandra Schools:—

S. N. Virgo (accepted)	£102
R. Langston-Jones & Co.	110
D. J. Macdonald	128
G. Weston & Sons, Ltd.	155
W. Lacey	160
J. C. Grant & Taylor	175

Ilford.—Two tenders have been received by the U.D.C. for a supply of tram-rails, and that of Messrs. A. McBean & Son (agents for the North-Eastern Steel Co.) has been accepted, at £8 2s. 6d. per ton for rails, and £9 7s. 6d. for fishplates. The other tender was from Messrs. Walter Scott & Co., at £8 10s. for rails, and £10 5s. for fishplates. Since the acceptance of the tender Mr. Sandberg has, under the special circumstances, reduced his usual fee on the rails by one half, and it will include the supervision and passing of the rails at the maker's works.

Keighley.—The Tramways Committee has provisionally accepted the tender of the Cedes Electric Traction, Ltd., for two more trolley vehicles, at £806 10s. each.

London.—Shoreditch.—The Electricity Committee has accepted the following tenders:—

Davidson & Co., Ltd.—Sirocco fan for induced draught capable of dealing with 120,000 cb. ft. of waste gases, complete with all apparatus, £200.
Electric Construction Co., Ltd.—85-B.H.P. continuous-current shunt-wound motor, £273.

Manchester.—The Corporation has placed with Messrs. Ferranti, Ltd., a contract for a two years' supply of D.C. and A.C. meters.

Southampton.—The tender of Messrs. Siemens Bros. and Co., Ltd., has been accepted by the T.C. for the supply of 100 iron insulator brackets for 2s. 1d. each, together with the necessary insulators, &c., at £2 12s. 6d per 100. A tender was also received from the General Electric Co., at 5s. 3d. each bracket, complete.

Sunderland.—The Electricity and Lighting Committee has conditionally accepted the tender of the General Electric Co., Ltd., for two rotary converters.

Swansea.—The tender of the British Thomson-Houston Co., Ltd., has been accepted by the T.C., at £216, for three feeder panels. The tender of Messrs. Herbert Morris, Ltd., has also been accepted, at £76, for a crane at the Uplands sub-station.

Walsall.—The Corporation Tramways Committee has accepted the tender of the Daimler Co., Ltd., for supplying four double-deck and two single-deck motor 'buses for £4,595, the Corporation purchasing the six sets of tires direct from the Dunlop Company, at £321 11s.

The following tenders have been accepted by the Electricity Committee:—

Babcock & Wilcox, Ltd.—Coal weigher, conveyer and boiler house bunkers and jib crane, £4,355.
Herbert Morris, Ltd.—Travelling crane, £652.
Underfeed Stoker Co.—Feed water heater and oil separator, £60.

West Ham.—The Education Committee has received the following tenders for arranging the electric lighting at the Clarkson Street School:—

Lund Bros. & Co.	£76
West Ham Electricity Department	70
T. G. Steel & Co.	65
Simmons & Co.	64
Troup, Curtis & Co.	60
J. T. Halsey	58

The tender of Mr. J. T. Halsey is recommended for acceptance.

The Education Committee is recommending the Town Council, owing to the changed conditions due to the war, to make an allowance to Mr. J. T. Halsey, whose tender was recently accepted at £538 for installing electric light at the Rosetta Road School, of the difference between the prices upon which the tender was based, and the actual cost to the contractor as shown by the invoices for materials supplied.

Whitby.—The B. of G. on Saturday accepted the tender of Messrs. Manlove, Alliott & Co., Ltd., for laundry plant, &c., for electric power, at £404.

Wolverhampton.—The T.C. is recommended to accept the tender of Messrs. Willans & Robinson, Ltd., for reconstructing the 2,000-kw. turbo-alternator at the generating station.

The Corporation Electricity Committee has accepted the tender of the Davenport Engineering Co., of Bradford, at £2,620, for water-cooling towers at the generating station.

York.—The Electricity Committee recommends the acceptance of the tender of the British Westinghouse Co., at £542 10s., for the supply of transformers, also that of Messrs. G. Robson and Co., of Sheffield, for a rail grinder for £65.

NOTES.

Light Railway Acts.—The Board of Trade have issued an additional Rule with respect to applications to the Light Railway Commissioners under the Light Railway Acts, 1896 and 1912. Copies of the Rule can be purchased, either directly or through the usual agents, from Messrs. Wyman & Sons, Ltd., Fetter Lane, Fleet Street, London, E.C.

Accident.—Whilst inspecting an electric fan at the Palladium Picture Hall, Oldham, last Wednesday, James Mawdesley, 38, electrical engineer, employed by Messrs. John Hall & Sons, Oldham, came into contact with the fan and received severe cuts on the head. He was removed to the Infirmary, where it was found necessary to put in about a dozen stitches.

Appointments Vacant.—Test room assistant (35s.), for Leith Corporation; generating engineer (£120), for Hackney B.C.; engineer (35s.), for County Hospital, Lincoln; senior engineer-in-charge (£104), junior engineer-in-charge (30s.), switchboard attendant (25s.), mains foreman (£2 10s.), for Newport Electricity and Tramways Department; jointer (42s.) for Rhondda U.D.C.; charge engineer (during war) for Wakefield Corporation (£2). Particulars are given in our advertisement pages.

Turbo-Generator Tests.—The two 3,000-KW., 3,000-R.P.M. turbo-generators installed at the Richmond Street generating station of the St. Marylebone electricity supply undertaking have recently been officially tested. These machines were fully described in our issue of December 5th, 1913; it will be remembered that up to the end of last year the St. Marylebone electricity supply generated for their mains direct current only by means of direct-current turbo-generators. The new Oerlikon turbo-generators generate three-phase current, which is transformed into direct current by means of rotary converters.

It will be seen from the accompanying table that during the week ending August 27th of this year the units generated by the direct-current plant were 1,264, whilst last year, during the same week, they amounted to 253,718; also, whilst last year, during the same week, no alternating current was generated, the A.C. units during the same week this year were 297,200. This shows that the manager gives preference to the running of the Oerlikon three-phase turbo-generators, and the reason why is obvious when the economy of these machines is appreciated. The makers believe that these figures have not been attained by any other machine in existence designed for the same conditions.

The Oerlikon Co. have allowed the electricity undertaking to increase the superheat beyond the value for which the turbines were designed (and at which they were tested) by an additional 100° F., and they also agree to a largely-increased overload capacity in view of the fact that the generators are running remarkably cool. In a letter addressed to the makers, Mr. A. Hugh Seabrook, general manager, congratulates them on the results obtained and on the manner in which the contract has been carried out; he had been sceptical as to their being able to improve upon the remarkable figure of 13·27 lb. steam consumption guaranteed at full load, and considers the low consumption actually attained a splendid achievement. The economy obtained, which is augmented by the increased superheat, and the increased overload capacity allowed, he says, "makes the cost of these plants ridiculous as compared with the value of them" to his department. Mr. Seabrook adds that the National Physical Laboratory has calibrated the instruments and checked the corrections and readings.

OFFICIAL TEST FIGURES.

Current:—Three-phase, 50 periods, 6,660 volts.
Normal Load:—3,000 KW. with temperature rise on generator not exceeding 54° F. after six hours.
Overload:—4,200 KW. with a temperature rise of 81° F. after six hours.
Speed:—3,000 R.P.M.
Steam:—190 lb. per sq. in. at 485° F.
Vacuum:—95 per cent.
Steam consumption under the above conditions:—

	Turbo No. 1.	*Turbo No.* 2.	*Guarantee.*
At full load (lb. per KW.-hour)	12·88	12·92	13·27
At ¾ load " "	13·04	13·21	13·73
At ½ load " "	14·00	14·05	14·70

WEEKLY STATEMENT ENDING WITH AUGUST 27TH, 1914, OF RICHMOND STREET GENERATING STATION OF THE ST. MARYLEBONE ELECTRICITY UNDERTAKING.

	This week			To date		
	1914.	1913.	1912.	1914.	1913.	1912.
Coal consumed (tons)	386	419	431	9,565	10,486	8,723
Per cent. inc. ...	−7·87	−2·79	13·42	−8·79	20·21	10·31
Aver. price per ton	14/0·24	15/1·86	14/2·04	14/6·12	14/10·37	15/11·52
Per cent. inc. ...	−7·49	6·95	32·70	−2·38	−6·87	48·01
Cost (£) ...	271	317	305	6,939	7,792	6,961
Per cent. inc. ...	−14·51	3·93	50·25	−10·95	11·94	63·25
Pence per unit sold	·306	·387	·375	·298	·365	·406
Per cent. inc. ...	−20·93	3·20	25·83	−18·36	−10·10	47·09
Units gener. D.C.	1,264	253,718	247,357	383,275	6,684,410	5,347,210
Do. gener. A.C. ...	297,200	—	—	7,206,450	—	—
Total ...	298,464	253,718	247,357	7,589,725	6,684,410	5,347,210
Units sold ...	212,100	196,800	195,300	5,594,000	5,120,275	4,114,850
Per cent. inc. ...	7·77	·768	19·54	9·25	24·42	10·95

The London branch of the Oerlikon company has recently received information from the works in Switzerland to the effect that the men are gradually returning from the front, where they were engaged in guarding the neutrality of the country, and that the factories are now working with, approximately, half the men and staff on half-time. All the contracts, and particularly those for British clients, are making good progress, considering the circumstances, and the transit and export routes are still kept open from Switzerland to this country and others.

Inquiries.—A correspondent asks us to recommend a good practical book on overhead lines, giving the calculations of stress on poles and wires, and the sizes of three-wire D.C. and A.C. mains. The subject is dealt with more or less fully in various books written to suit American conditions, but we know of none that meets the requirements in English units.

Another correspondent asks for names and addresses of British manufacturers of "chucks for radial drilling machines."

A further inquiry is for the address of "manufacturers of brass and iron ornamental castings suitable for fittings and radiators," &c.

For Sale.—The Postmaster-General invites tenders for the purchase of electrical power plant and machinery at the Head Post Office, Manchester. Particulars are given in our advt. pages.

Fatalities.—The circumstances of the death of George Foster (58), telephone wireman, Oldham, were inquired into last Friday. Deceased had been a telephone wireman for about 30 years. Foster put a ladder against a pole, and ascended until he was about 24 ft. from the ground. The pole cracked at the bottom, and then swayed over for about a yard, and, after stopping momentarily, crashed to the ground. Foster fell clear of the pole. Mr. Hinchliffe, electrical engineer, of Oldham, said there was no sign of weakness or decay about the pole as far as could be seen outwardly. "Accidental death" was the verdict.

At the Maritime and Penrhiw Collieries, Pontypridd, near Cardiff, where the machinery is all electrically driven, a fatal accident occurred on September 10th, to one of the electricians in charge of two pumps. From the evidence given at the inquest on Saturday, it appeared that one of the pumps failed to work, and an electrician of 10 years' experience, named Edmund Davies, together with a mate, set to work to find out the cause of the stoppage. Davies went to a switch box and examined the fuses, and on finding no defect, he went away to another pump, leaving the iron lid of the switch box off. Returning he picked up the lid to replace it, and he immediately shouted out, "Oh, God!" turned round once or twice, and fell down. As his mate went towards him, he jumped up again, and said, "All right, Ted," but soon afterwards fell down again. Some ambulance men hearing the mate's call for assistance, ran to the deceased, who was picked up insensible, and although the men tried for two hours to restore respiration, they were unsuccessful. It was discovered that the cause of the pump not working was that one of the wires at a terminal had become oxidised all the way through. The voltage was 290. A verdict of "Accidental Death" was returned.

Electric Pumping at Oilfields.—In the course of their annual report the directors of the Kern River Oilfields of California, Ltd., state that the gross profit in California from the Kern River Field (section 33) amounted to £24,692, as against £23,642 for the previous year. This increase was obtained (notwithstanding a natural decrease in production) by the more extensive use of electric pumping and by the exercise of rigid economy in the operation of the property. The following comparative statement shows the number of oil wells operating and the gross production of section 33 Kern River Field:—

	May 31st, 1913.	May 31st, 1914.	Aug. 31st, 1914.
Number of wells pumped electrically	181	197	230
Number of wells pumped by steam	59	43	11
	240	240	241
Gross production in barrels ...	984,175	883,268	209,660

The Rights of Alien Enemies to Sue.—An important case bearing upon the rights of alien enemies to sue British subjects in the Courts during the war, was before Mr. Justice Sankey, in Chambers, on Tuesday. The matter is fully reported in Wednesday's *Daily Telegraph*. It appears that Sir John Macdonnell, Master of the Supreme Court, recently heard an application in a case in which the plaintiffs were the Fabrik Elastischer Gluckkoerper, G.m.b H., and the defendants the Imperial Lamp Works (Brimsdown), Ltd. It was argued on that occasion that as the plaintiffs (who claimed for about £900 for goods supplied) were alien enemies, they could not be heard in our Courts; but, on the other hand, it was contended that an alien enemy had been allowed to prove a debt under bankruptcy; and that if the action was now dismissed, a fresh action could not be brought. Sir John Macdonnell granted an order to stay, with liberty to apply. This order was on Tuesday appealed against by Mr. J. Scarlett, on behalf of the defendants, who urged that the action should be dismissed, so that the plaintiffs, who were alien enemies, would be barred from further maintaining and continuing it. He objected to the appearance of Mr. A. H. Spokes for the plaintiffs, on the ground that he represented an alien enemy.

Mr. Justice Sankey, in giving judgment, said it was admitted that the plaintiffs were alien enemies. There had been a number of cases where counsel had been heard by the Courts on behalf of alien enemies. His Lordship did not think it was the duty of a Judge to lay down any decision on public policy. As he understood it, paramount public policy was not to allow an enemy to get any money during a war, and that public policy seemed to him to be amply secured by making a stay which would prevent him from going on with a remedy which might result in his getting money. Whether it was public policy to say that a debt which was certainly owing before the beginning of the war should be entirely barred he begged leave to doubt. What had been said by other Judges was that the remedy which enabled him to obtain the payment of that debt from a citizen of this country was suspended till the war was concluded. Under these circumstances he thought that the order made by Master Macdonnell was perfectly right. It was, he thought, perfectly open for the defendants to go on with their counterclaim. The simple order that he made was this—an order to stay the claim—by which he meant a distinction between the claim and the counterclaim—with liberty to apply, counsels' costs reserved. Leave to appeal was granted.

Educational Notes.—ROYAL COLLEGE OF SCIENCE FOR IRELAND, Dublin.—Faculty of Engineering. Particulars of courses in Mechanical, Electrical Engineering are obtainable from the Registrar, Royal College of Science, Upper Merrion Street, Dublin. See also our advertisement pages to-day.

Airships over London.—During the past week the military authorities have been making observations from airships over London, and in compliance with police orders a large proportion of the street lamps and of the shop-window lighting has been cut off, the illumination of railway stations with glass roofs has been lowered, and prominent electric signs have not been in operation. The effect of the reduction of lighting on the streets was remarkable. In some cases arc lamp globes were painted so as to screen their rays in certain directions. An electric searchlight at Charing Cross swept the sky. It is understood that the observations are intended to enable precautions to be taken against the identification of important buildings, &c., by hostile airships, which are quite capable of visiting the metropolis and dropping bombs upon it. London, being an "open" city, and therefore by international law immune from bombardment, is, of course, just the sort of place that the apostles of German "culture" would seek to attack.

400-Mile Transmission Completed.—With the closure of the tie-line switch at San Bernardino, Cal., on August 13th, energy was transmitted from Bishop Creek to El Centro, Cal., a distance of 400 miles, completing the longest transmission circuit in the world. The new line brings electric service into the Imperial and Coachella valleys.—*Electrical World.*

Late Correspondence.—CARBONS.—My letter of the 9th inst., appearing in your issue of the 11th inst., asked Mr. Alwood two questions, which I hope may be answered in your next number.

Your Editorial comments on my letter, however, make it essential for me to amplify my second question, and ask whether the Witton carbon undertaking, or the G E C., have handled any other carbons than those actually manufactured in England?

INQUIRER.

London.

Malicious Damage to Railway Signals.—In revenge, because the L.B. & S.C. Railway Co. would not let him work overtime, R. Hamper, a foreman, cut electrical signalling wires on the line at Battersea when soldiers were being conveyed to the South. He was sentenced to 12 months' hard labour.

Wireless Operators Wanted.—The Admiralty still wants wireless operators for enrolment in the Royal Naval Reserve, for service in the Royal Navy during the period of hostilities. Particulars can be had from the Secretary of the Admiralty (N.), London, S.W.

OUR PERSONAL COLUMN.

The Editors invite electrical engineers, whether connected with the technical or the commercial side of the profession and industry, also electric tramway and railway officials, to keep readers of the ELECTRICAL REVIEW *posted as to their movements.*

Central Station Officials.—The Dublin Electricity Committee last week brought up recommendations for increases in the salaries of MR. MARK RUDDLE, the city electrical engineer, and MR. G. ARCHER, chief engineer of the distribution department, such increases not to take effect until after the war. The Lord Mayor said that it would do no harm to have the report sent back for six months at least, and this course was agreed to. Perhaps at that date, when justice is being meted out generally, gallant little Belgium and the hope-deferred Belfast electricity works staff will alike receive their due share of compensation.

On the occasion of his marriage to Miss Nini E Threlfall, B.A., of Southport, MR. THOS. CLEATON BALL, mains inspector at the Mersey Railway Power Station, Birkenhead, has been presented by the employés with a case of cutlery, and with a silver cigarette case by the men of his department.

MESSRS T. NUTTER and J. BOLTON, chief assistant and assistant respectively at the Burnley electricity works, have withdrawn their applications for an increase in their respective salaries because of the present situation.

MR. H. HOPKINSON has been appointed canvasser at the Walsall electricity works; MR. A. E. SMITH has been appointed sub-station mechanical assistant.

Tramway Officials.—MR. W. T. D. GRUNDY, of Morecambe, has been appointed general manager of the Derwent Valley Light Railway.

General.—On Saturday last, the 12th inst., Mr. W. L. Topple, superintendent of the Electric and Ordnance Accessories Co., Ltd., Aston, presented, on behalf of the staff, to MR. C. BRITTLEBANK, chief of the sales department, a case of table cutlery, on the occasion of his marriage with Miss Rawlinson, of Manchester. Mr. Topple referred to the high esteem in which Mr. Brittlebank was held, and Mr. J. D. Morrison, secretary of the company, spoke in similar terms. Mr. Brittlebank suitably responded.

SIR ANDREW MCDONALD is to contribute £500 to meet the cost of the improvements which have recently been carried out by the managers of the Edinburgh Royal Infirmary in the medical electrical departments of the Institution.

MR. D. FURNISS, who is leaving to become chief electrical engineer at the Collieries at Thorncliffe of Newton, Chambers and Co, Ltd., has been presented with a fitted gladstone bag by the officials at Shirebrook Colliery, where he has been on the electrical staff.

Mr. Theodore Schontheil, engineer, who is a British subject, residing at Silbrook Heoldon, Whitchurch, Glamorgan, announces in the *London Gazette* that on September 14th, 1914, he renounced the surname of Schontheil, and then adopted the name of THEODORE STRETTON.

MR. PHILIP AUGUSTUS LANG (heretofore known as Mr. P. A. Lange), managing director of the British Westinghouse Electric and Manufacturing Co., Ltd., of Trafford Park, who is a naturalised British subject, and formerly an American citizen, has given notice that on Saturday he renounced the use of the surname Lange, and adopted the name of Lang.

NEW COMPANIES REGISTERED.

United Kingdom Manufacturers' Representative Association, Ltd. (137,625).—This company was registered on September 9th, with a capital of £10,000 in £1 shares (5,000 6 per cent. participating preferred), to carry on the business of providing manufacturers' representatives and agents in all parts of the world, merchants, traders, forwarding and general agents, contractors or sub-contractors for the purchase or supply of British products and commodities, general merchandise and all classes of English goods, either in the United Kingdom or elsewhere, and to bring to bear diplomatic and other pressure with regard to tariff restrictions and infringements under the Merchandise Marks Acts. The subscribers (with one share each) are:—E. H. Burton, 16, St. Helen's Place, E.C., F.I.C.A.; E. J. Howell, Gorselands, Southbourne, Hants, gentleman; J. Molenkamp, 24, King's Avenue, Clapham Park, S.W., gentleman; C. T. B. Jayne, 95, High Road, Streatham, S.W., director; G. Prosser, 19, Elgin Court, Maida Vale, W., gentleman; J. R. P. Jackman, 2, Hugh Street, S.W., gentleman; C. Burton, 37, Surrey Street, W.C., advertising contractor. Minimum cash subscription, seven shares; the number of directors is not to be less than two or more than seven; the first are J. Molenkamp, C. T. B. Jayne, G. Prosser and C. Burton; qualification of first directors £1, of other directors £50 shares or stock; remuneration as fixed by the company. Registered by Lloyd, Richardson & Co., 3, Howard Street, Norfolk Street, W.C.

Anti-German League, Ltd. (137,638).—This company was registered on September 11th, with a capital of £500 in £1 shares, to take over the business carried on at 97B, Regent Street, London, as the Anti-German League, formed to assist British trade, to carry on business as warehousemen, agents, importers, exporters, and general merchants, and to enter into an agreement with C. Clarke. The subscribers (with one share each) are:—C. Clarke, Cranleigh, Egham, Surrey, merchant; M. B. Pizzey, Heath Villa, Ascot, Berks., accountant. Private company. The number of directors is not to be less than two or more than three; the first are C. Clarke and M. B. Pizzey; remuneration as fixed by the company. Secretary, J. Myers, 65, London Wall, E.C.

A. V. Gifkins & Co., Ltd. (137,615).—This company was registered on September 9th, with a capital of £10,000 in £1 shares, to carry on the business of electricians, suppliers of electricity for light, heat, motive power or otherwise, &c., and to enter into an agreement with A. V. Gifkins and D. Goad. The subscribers (with one share each) are:—A. V. Gifkins, Crescent Lodge, Hertford, engineer; H. S. Watson, 9, Purley Park Road, Purley, engineer. Private company. The number of directors is not to be less than two or more than five; the first are A. V. Gifkins, D. Goad and H. S. Watson (all permanent, subject to holding £1,000 shares each). The said A. V. Gifkins, while holding office as permanent director, may appoint two additional permanent directors, whose holding must be £1,800 shares each. Remuneration as fixed by the company. Registered office, 68, Victoria Street, S.W.

Stonebridge Electrical Co., Ltd. (137,652).—This company was registered on September 11th, with a capital of £1,000 in £1 shares, to carry on the business of electrical and general engineers, contractors for, manufacturers of, and dealers in, plant, machinery, engines and implements used in connection with the generation, supply, distribution, accumulation and use of electricity for heat and power, &c. The subscribers are:—K. H. Gyr, Zug, Switzerland, manufacturer of electrical apparatus, 100 shares; L. R. Lester, 1, Stonebridge Park, Willesden, N.W., engineer, 50 shares. Private company. The first directors are K. H. Gyr, L. R. Lester and H. Landis. Registered office, 1, Stonebridge Park, Willesden, N.W.

Electropathic Institute, Ltd. (137,626).—This company was registered on September 9th, with a capital of £3,000 in £1 shares (2,500 participating preference) to take over the business of electrical treatment and the manufacture and sale of electrical appliances carried on by E. T. Braarup, at 13, Old Quebec Street, London, as E. Braarup. The subscribers (with one preference share each) are:—C. Philip, 4, Bertram Road, Enfield, clerk; W. H. Hayles, 3, Manchester Street, W.C., company secretary. Private company. The number of directors is not to be less than two or more than seven; the first are not named; remuneration not more than £100 each per annum. Registered office, 13, Old Quebec Street, Marble Arch, W.

OFFICIAL RETURNS OF ELECTRICAL COMPANIES.

Henley's (South Africa) Telegraph Works Co., Ltd.—Capital, £2,000 in £1 shares. Return dated June 5th, 1914; all shares taken up; £1 per share called up; £2,000 paid. Mortgages and charges: Nil.

Chilian Electric Tramway and Light Co., Ltd. (57,203).—Capital, £1,150,000 in 500,000 ord. and 650,000 pref. shares of £1 each. Return dated July 16th, 1914; all shares taken up; £1 per share called up on the pref.; £650,000 paid; £300,000 considered as paid on the ord. Mortgages and charges: £307,000.

Chemico Electric Co., Ltd.—Particulars of £50,000 debs., created August 12th, 1914, filed pursuant to Sec. 93 (3) of the Companies' (Consolidation) Act, 1908, the whole amount being now issued. Property charged: the company's undertaking and property, present and future, including uncalled capital, if any. No trustees.

James Keith & Blackman Co., Ltd.—A memorandum of satisfaction in full on August 24th, of second debs., dated February 9th, 1914, securing £1,900, has been notified. Issue on September 8th, 1914, of £600, part of a series of which particulars have already been filed.

Lester B. Betts & Co, Ltd.—Debenture dated September 2nd, 1914, to secure £100 charged on the company's undertaking and property, present and future, including uncalled capital. Holder: A. E. Robinson, 60, Whitefriars Crescent, Westcliff-on-Sea.

Sutcliffe (of Crumpsall), Ltd.—Particulars of £4,000 debentures created April 15th, 1914, filed pursuant to Sec. 93 (3) of the Companies' (Consolidation) Act, 1908, the whole amount being now issued. Property charged: The company's undertaking and property, present and future, including uncalled capital. No trustees.

CITY NOTES.

Automatic Telephones (Australia), Ltd.

According to Australian newspapers to hand by the last mail, this company was to hold its annual meeting on August 5th. The directors in their report stated that the year ended June 30th had been satisfactory. The net profits available for distribution was £4,167, out of which £417 was absorbed by managing directors' remuneration, £3,750 was required for the proposed dividend of 7½ per cent., and £1,181 was to be carried forward. The directors stated that the contracts referred to last year were not quite completed, although two automatic exchanges, viz., Brighton and Newtown (and since June 30th, a third, viz, Balmain), had been "cut over" to the entire satisfaction of the department. While in Chicago Mr. Nicholson made arrangements which enabled the company to submit a favourable price to the Federal Government for a further group of seven exchanges in Sydney, and just before the year closed this price (£100,318) was accepted. The current year should, therefore, be a busy one, affording profitable employment for the company's capital, the bulk of which was lying at call. Under a new agency agreement with Automatic Electric Co., Chicago, no cash deposit had been required, better terms had been arranged, and a much longer period granted upon reasonable conditions.

Dumbarton Burgh and County Tramways, Ltd.

Mr. George Balfour, chairman of directors, in moving the adoption of the report at the annual meeting, said the total receipts for the year amounted to £23,563, being an increase of £611 in traffic receipts and advertising, notwithstanding a reduction of £250 in advertising receipts. Expenses had increased by £1,250, the increase in traffic expenses being £235, and in general expenses £380, which was largely accounted for by increase in third party insurance and rates and taxes. The most gratifying feature was the continuing increase in traffic receipts during the last three years. The company's cars ran 549,993 miles during the year, and carried 3,634,632 passengers. Mr. Balfour moved that the following dividends be paid:—A dividend on the preference shares at the rate of 6 per cent. per annum for the half-year to July 31st, 1914, and a dividend on the ordinary shares at the rate of 1½ per cent. for the year. The motion was unanimously carried.

Electric Supply Co. of Victoria, Ltd.

—The report for the year ended March 31st, 1914, states, says the *Financial Times*, that the net profit has again improved, notwithstanding the heavily increased wages payable under various Trade Board determinations, &c. A further trouble has been the prevalence of bad trade in Bendigo. To meet additional capital expenditure incurred, to the amount of £8,898, chiefly in the extension of the lighting undertakings, necessitated by the increasing business of the company in those departments, a further issue of preference shares has been made. The balance to the credit of profit and loss account, including £7,569 brought forward from the previous year, and after deducting debenture interest paid and amount transferred to debenture stock redemption account, is £23,011, which the directors propose dealing with as follows:—To pay on account of arrears of preference dividend, thus extinguishing all arrears to March 31st, 1913, £16,211; to place to depreciation of stores £1,000, to write off "Discount and commission on debenture stock account" £2,174, and to carry forward £3,625.

South Metropolitan Electric Light and Power Co., Ltd.

—The books will be closed from 17th to 30th inst. (inclusive) for preparation of warrants for interest on the 4½ per cent. first mortgage debenture stock payable on 1st prox. for the half-year to that date.

Brazilian Traction, Light and Power Co., Ltd.

—The directors have declared a dividend of 1½ per cent. for the three months ending September 30th on the 6 per cent. cumulative preference shares, payable October 1st.

Direct Spanish Telegraph Co., Ltd.

—The board has decided to pay, in addition to the dividend at the rate of 10 per cent. per annum on the preference shares, a dividend at the rate of 4 per cent. per annum, free of income-tax, on the ordinary shares, both for the half-year ended June 30th, 1914, and payable on October 1st next.

Eastern Extension, Australasia and China Telegraph Co., Ltd.

—The directors have declared an interim dividend for the quarter ended June 30th last of 2s. 6d. per share, free of income-tax, payable October 15th.

Eastern Telegraph Co., Ltd.

—The directors announce the payment on October 15th of a dividend at the rate of 3½ per cent. per annum, less income-tax, on the preference stock for the quarter ending September 30th, and the second quarterly interim dividend of 1½ per cent. on the ordinary stock, free of income-tax, in respect of profits for the year ending December 31st next.

Bromley (Kent) Electric Light and Power Co., Ltd.

—The directors have declared a dividend at the rate of 4 per cent. per annum (2s. per share), less income-tax, on the ordinary shares for the past half-year (interim).

Halifax and Bermudas Cable Co., Ltd.

—The directors have declared a dividend of 3 per cent. (3s. per share), free of income-tax, for the half-year, payable September 16th, making 6 per cent. for the year.

Direct West India Cable Co., Ltd.

—Dividend 3 per cent. (1s. 6d. per share), free of income-tax, for the half-year, payable September 16th, making 6 per cent. for the year.

Canada.

—According to a Reuter dispatch, the Civic Board of Control has decided to purchase the property of the Montreal Water and Power Co. for $7,500,000.

Globe Telegraph and Trust Co., Ltd.

—The directors announce a quarterly interim dividend of 2s. per share on the ordinary shares.

British Insulated and Helsby Cables, Ltd.

—An interim dividend at the rate of 8 per cent. per annum, less income-tax, on the ordinary shares for the past half-year, is announced.

Mather & Platt, Ltd.

—The *Financial Times* states that the payment of the dividend of 1s. per share on the ordinary shares announced for distribution on September 1st, has been postponed, but the dividend on the preference shares was duly paid.

British Aluminium Co., Ltd.

—The directors announce a six months' interim dividend at the rate of 6 per cent. on preference shares. Warrants will be posted on September 30th.

STOCKS AND SHARES.

Tuesday Evening.

The much more satisfactory character of the news from the front produced an instantaneous effect in Stock Exchange circles. It was felt that continuance of such intelligence would hasten the reopening of the Stock Exchange; and Consols, which had changed hands at 65½, rose to 68¾. A number of Home Railway stocks, hitherto practically unsaleable, suddenly found supporters. It was almost amusing to notice how those who had been pathetic sellers, when they could not obtain bids, became converted into ready buyers as soon as the enemy's advance had been changed into retreat.

While general recognition admits that there is plenty of stubborn fighting to be done before the end arrives, the reaction, from what we may call the courageous despondency of the end of August, has produced a marked effect upon quotations, to such an extent that the daily crowd in Throgmorton Street swelled to several times its previous proportions, and practically every broker is able to report inquiries amongst his clients for stocks offered at bargain prices. The movement has not been confined to London; from the provincial centres the same earnest of bargain-hunting is reported. It is wonderful—and yet perhaps less wonderful than it appears—what a different sentiment has been diffused by receipt of the more cheery news.

Several of the West End electric lighting companies are amongst those to whom the ill wind has blown unexpected profit. Instead of mansions and Government offices being closed during August and the first half of September, with consequent falling-off of electric lighting requirements, the war has kept people in town to such an extent that, in the case of at least one company, the load for the past six weeks has been heavier than ever before in the history of the concern, and to supply the "juice" has imposed an unlooked-for strain upon the company's resources.

The City companies are in a position not so enviable as that of the West End undertakings, but, August and September both being very slack months in the ordinary way, they have suffered no perceptible diminution in revenue up to the present.

Stock is not so readily offered as it was when we last wrote, but there is still a certain amount which can be picked up cheaply. Pursuing our tables of last week, showing various prices at which stocks and shares would give certain yields, we now set out a few examples in the Telegraph and Manufacturing sections, with the same object. These will enable the prospective purchaser to judge at what prices he considers securities are cheap :—

Name.	Dividend.	Present price.	Yield. £ s. d.
Anglo-American Telegraph Pref. ..	6	108⅝	5 10 6
		105	5 14 3
		102½	5 17 1
Eastern Telegraph Ordinary ..	7	132	5 6 3
		127	5 10 3
		122	5 14 9
Globe Ordinary	6	11½	5 4 6
		11	5 9 1
		10½	5 14 3
Western Telegraph	7	13⅝	5 1 0
		13½	5 5 8
		12⅝	5 9 10
Babcock & Wilcox	16	2⅝	5 11 6
		2⅝	6 1 11
		2¼	7 2 3
Callenders	15	12½	6 2 6
		11⅝	6 7 8
		11½	6 10 5
India-Rubber	7½	9⅝	7 18 0
		9	8 6 8
		8½	8 16 6

The Stock Exchange Committee have taken a definite step towards re-opening the House by the issue of a list of prices fixed in accordance with their order, dated September 14th. This is regarded on all hands as an indication that the House may get to work sooner than was expected by those who talked about "after Christmas" as the probable date of re-opening. The list consists of four pages, which are about one-third of the size of the regular 16-page sheet. We set out those connected with the electric markets :—

Stock.	Present price.
Central London 4 per cent. Debenture	96
„ 4½ per cent. Preference	103
London Electric 4 per cent. Debenture	88⅝
Metropolitan 3½ per cent. Debenture	86
„ 3½ per cent. "A" Debenture	85
„ 3½ per cent. Preference	80½
„ 3½ per cent. "A" Preference	77½
„ 3½ per cent. Conv. Pref.	77½
Met. District 4 per cent. Prior Lien Deb.	95½

These prices are unchanged from those of July 30th, but in several instances the stocks can be bought below the levels given. Metropolitan "A" Preference, for example, is offered at 76, London Electric Debenture at 87½, free of stamp duty, and so on.

More interest attaches to the prices at which Miscellaneous securities are actually on offer, and to those at which they can be sold. There is a much greater variety in the former than there is in the latter list, and some examples may be set out :—

Stock offered.	Price.	Yield. £ s. d.	Dividends.
Anglo-Argentine Trams 5 per cent. Debenture stock	93¼	5 7 0	June 1st and Dec.
Anglo-Argentine Trams 5½ per cent. First Preference	4½	5 17 0	Jan. 1st and July
British Columbia Electric Railway 5 per cent. Preference	96	5 4 0	Jan. 15th and July
British Electric Traction 4½ per cent. Second Debenture stock	75	6 0 0	May 1st and Nov.
City of London Electric 6 per cent. Preference shares	122½ xd	4 14 0	March and Sept.
London Electric Supply 6 per cent. Preference shares	4⅞ xd	6 3 0	March and Sept.
Metropolitan Trams 5 per cent. Debenture stock	86	5 16 0	April 1st and Oct.
Rio de Janeiro Trams 5 per cent. Second Mortgage bonds	88½	5 13 0	April 1st and Oct.
Urban Electric Supply 4½ per cent. Debenture stock	84½	5 6 6	April 1st and Oct.

Amongst the stocks which are wanted for cash we may mention the following :—

STOCKS WANTED.

Anglo-Argentine Trams 4½ per cent. Debenture.
Calcutta Electric Supply Ordinary.
Calcutta Electric Supply Preference.
Calcutta Tramways Ordinary.
Central Electric Supply 4 per cent. Debenture.
Charing Cross Electric Preference.
City of Buenos Ayres Trams Ordinary.
Consolidated Gas, Electric Light and Power of Baltimore 5 per cent. Debenture.
Metropolitan Electric Supply Ordinary.
Melbourne Electric Supply First Debenture.
Mexico Tramways First Mortgage 5 per cent. Bonds.
Mexican Light and Power First Mortgage 5 per cent. Bonds.
Sao Paulo Tramways 5 per cent. Debenture Stock.
St. James' Electric Light Preference.
South Metropolitan Electric First Preference.
United Electric Trams of Monte Video 5 per cent. Debenture.

The Home Railway market has taken on a much cheerfuller aspect ; in fact, it is more easy to sell many stocks than it is to buy them at present figures. If the news continues to advance in the same direction as everybody's hopes, there will be a rush to buy everything of the investment character. The demand, it may be noticed, has not yet extended to speculative issues. Rubber shares are on the rise, the theory being that rubber-tired motor vehicles will become universally used for commercial purposes after the war, owing to the scarcity of horses, and to the fact that the Army had made such heavy inroads upon the horses used by Trade prior to the outbreak.

MARKET QUOTATIONS.

OWING to the war, the prices given below are, of course, only nominal.

Wednesday, September 16th.

CHEMICALS, &c.	Latest Price.	Fortnight's inc. or Dec.
a Acid, Hydrochloric .. .. per cwt.	Nom.	..
a „ Nitric .. .. .. „	„	..
a „ Oxalic .. .. .. per lb.	„	..
a „ Sulphuric .. .. .. per cwt.	„	..
a Ammoniac Sal .. .. .. „	„	..
a Ammonia, Muriate (large crystal) per ton	„	..
a Bleaching powder .. .. .. „	„	..
a Bisulphide of Carbon .. .. „	„	..
a Borax .. .. „	„	..
a Copper Sulphate .. .. .. „	„	..
a Lead, Nitrate .. .. .. „	„	..
a „ White Sugar .. .. „	„	..
a „ Peroxide .. .. .. „	„	..
c Methylated Spirit .. .. .. per gal.	„	..
a Potassium, Bichromate, in casks per lb.	„	..
a Potash, Caustic (88/90 %) .. per ton	„	..
a „ Chlorate .. .. .. per lb.	„	..
a „ Perchlorate .. .. „	„	..
a Potassium, Cyanide (98/100 %) .. „ (for mining purposes only)	„	..
a Shellac .. .. per cwt.	„	..
a Sulphate of Magnesia .. .. per ton	„	..
a Sulphur, Sublimed Flowers .. „	„	..
a „ Recovered .. .. „	„	..
a „ Lump .. .. .. „	„	..
a Soda, Caustic (white 70/72 %) .. „	„	..
a „ Chlorate .. .. .. per lb.	„	..
a „ Crystals .. .. .. per ton	..	..
a Sodium Bichromate, casks .. per lb.	..	..
METALS, &c.		
b Aluminium Ingots, in ton lots .. per ton	£88	..
b „ Wire, in ton lots (1 to 14 S.W.G.) „	£112	..
b „ Sheet, in ton lots .. „	£112	..
g Babbitt's metal ingots .. .. „	£50 to £221	..
c Brass (rolled metal 2" to 12" basis) per lb.	8d.	½d. dec.
c „ Tube (brazed) .. .. „	10d.	..
c „ „ (solid drawn) .. „	8¼d.	½d. dec.
c „ Wire, basis .. .. .. „	8d.	½d. dec.
c Copper Tubes (brazed) .. .. „	9¾d.	½d. dec.
c „ „ (solid drawn) .. „	9½d.	½d. dec.
g „ Bars (best selected) .. per ton	Nom.	..
g „ Sheet .. .. .. „	Nom.	..
g „ Rod .. .. „	Nom.	..
d „ (Electrolytic) Bars .. „	£59	£6 dec.
d „ „ Sheets .. „	£77	£6 dec.
d „ „ Rods .. „	£65	£6 dec.
d „ „ H.C. Wire per lb.	8d.	¾d. dec.
f Ebonite Rod .. .. .. „	3/6	1/- dec.
f „ Sheet .. .. .. „	3/-	1/- dec.
a German Silver Wire .. .. „	1/7	..
h Gutta-percha, fine .. .. „	6/10	..
h India-rubber, Para fine .. .. „	2/8½	1½d. dec.
l Iron Pig (Cleveland warrants) .. per ton	62/11	..
l „ Wire, galv. No. 8, P.O. qual. „	£16	..
g Lead, English Pig .. .. .. „	Nom.	..
m Manganin Wire No. 28 .. .. per lb.	6/6	..
g Mercury .. .. per bot.	£7	..
e Mica (in original cases) small .. per lb.	4d. to 2/6	..
e „ „ „ medium „	8/- to 5/-	..
e „ „ „ large .. „	6/6 to 10/6 & up.	..
o Nickel, sheet, wire, &c. .. .. „	Nom.	..
p Phosphor Bronze, plain castings „	1/1 to 1/3½	..
p „ „ rolled bars & rods „	1/0½ to 1/3	..
p „ „ rolled strip & sheet „	1/2½ to 1/5½	..
e Platinum .. .. per oz.	185/-	..
d Silicium Bronze Wire .. .. per lb.	10½d.	..
r Steel, Magnet, in bars .. .. per ton	£141	..
g Tin, Block (English) .. .. „	Nom.	..
n „ Wire, Nos. 1 to 16 .. .. per lb.	2/3	..
p White Anti-friction Metals .. per ton	£44 to £194	..
k Zinc, Sh'ts (Vieille Montagne bnd.) „	Nom.	..

Quotations supplied by—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons.
f India-Rubber, Gutta-Percha and Telegraph Works Co., Ltd.
g James & Shakspeare.
h Edward Till & Co.
l Bolling & Lowe.
k Morris Ashby, Ltd.
l Richard Johnson & Nephew, Ltd.
m W. T. Glover & Co., Ltd
n P. Ormiston & Sons.
o Johnson, Matthey & Co., Ltd.
p
r W. F. Dennis & Co.

Dundee, Broughty Ferry and District Tramways Co., Ltd.—The profits for the year ending July 31st, including sum brought forward from last year, after providing for interest on debenture stock, amount to £4,824. From this there falls to be deducted interim dividend paid on preference shares for half-year to January 31st, 1914, at the rate of 6 per cent. per annum, less tax, leaving a balance of £3,411. The directors propose to pay final dividend on preference shares at the rate of 6 per cent. per annum for half-year ending July 31st, 1914, less tax ; to renewals fund, £600 ; to sinking fund for redemption of debenture stock, £600 ; to pay dividend on ordinary shares at the rate of 2½ per cent. for year ending July 31st, 1914, less tax ; to carry forward £127. The receipts for the year have been very well maintained.

THE RATING OF BARE COPPER CONDUCTORS.

By W. A. COATES.

Apparently but few engineers have concrete ideas with regard to the carrying capacity of bare copper conductors. With a view to filling up the gap, the figures employed by some of the foremost switchboard firms on both sides of the Atlantic have been studied, and the tables below are therefore fully representative of first-class practice.

German and American firms have mostly adopted a temperature rise of 30° C. as standard for switchboard connections. British builders are usually more conservative,

TABLE I.—Maximum Permissible d.c. Load in Amperes. Single Copper Strips.

Size.	Section sq. in.	Maximum guaranteed temperature rise. 20° C.	30° C.	40° C.
1 in. × $\frac{1}{16}$ in.	·0625	130	160	185
1 „ × $\frac{1}{8}$ „	·125	185	230	260
1 „ × $\frac{1}{4}$ „	·25	265	325	375
1½ „ × $\frac{1}{8}$ „	·1875	275	340	390
1½ „ × $\frac{1}{4}$ „	·375	390	480	550
2 „ × $\frac{1}{8}$ „	·25	360	445	510
2 „ × $\frac{1}{4}$ „	·50	515	630	730
3 „ × $\frac{1}{8}$ „	·375	490	600	690
3 „ × $\frac{1}{4}$ „	·75	690	850	975
4 „ × $\frac{1}{8}$ „	·5	610	750	860
4 „ × $\frac{1}{4}$ „	1·0	870	1,060	1,230
6 „ × $\frac{1}{8}$ „	·75	940	1,150	1,320
6 „ × $\frac{1}{4}$ „	1·50	1,330	1,630	1,880

and work to a limit of 20° C. The tables have consequently been based on the latter figure. The safe load to give any desired temperature rise is easily determined from the formula :—

$$A_x = A_{20} \sqrt{x/20}$$

where A = total current in conductor and x = new temperature rise in °C.

The actual capacity of a conductor depends not only on its cross-sectional area, but also on its effective radiating

TABLE II.—Maximum Permissible d.c. Load in Amperes. Copper Strips in Parallel.

Guaranteed temperature rise not exceeding 20° C.

No. of strips.	Size each strip.	Total section sq. in.	Strips spaced apart. ¼ in.	½ in.	¾ in.
2	2 in. × ⅛ in.	·5	620	640	700
	3 in. „ „	·75	820	840	930
	4 in. „ „	1·0	1,040	1,080	1,180
	6 in. „ „	1·5	1,600	1,650	1,810
3	2 in. „ „	·75	720	860	1,020
	3 in. „ „	1·125	980	1,170	1,370
	4 in. „ „	1·5	1,220	1,470	1,710
	6 in. „ „	2·25	1,900	2,260	2,640
4	3 in. „ „	1·5	1,080	1,390	1,610
	4 in. „ „	2·0	1,350	1,730	2,000
	6 in. „ „	3·0	2 060	2,660	3 060
5	3 in. „ „	1·875	1,270	1,680	1,980
	4 in. „ „	2·5	1,590	2,100	2,480
	6 in. „ „	3·75	2,450	3,240	3,800
6	3 in. „ „	2·25	1,470	1,980	2,340
	4 in. „ „	3·0	1,840	2,480	2,940
	6 in. „ „	4·5	2,800	3,800	4,500
7	3 in. „ „	2·625	1,670	2,380	2,700
	4 in. „ „	3·5	2,080	2,860	3,400
	6 in. „ „	5·25	3,180	4,370	5,230
8	3 in. „ „	3·0	1,860	2,580	3,080
	4 in. „ „	4·0	2,320	3,200	3,860
	6 in. „ „	6·0	3,560	4,940	5,920
9	3 in. „ „	3·375	2,050	2,880	3,460
	4 in. „ „	4·5	2,570	3 600	4,330
	6 in. „ „	6·75	3,940	5,500	6,650
10	3 in. „ „	3·75	2,250	3,180	3,840
	4 in. „ „	5·0	2,800	3,970	4,800
	6 in. „ „	7·5	4 330	6,100	7,350
11	4 in. „ „	5·5	3,060	4,350	5,270
	6 in. „ „	8·25	4,700	6,670	8,100
12	4 in. „ „	6·0	3,300	4,700	5 730
	6 in. „ „	9·0	5,060	7,250	8,800

surface. A single strip standing on edge is the ideal conductor from this point of view. If it lies flat, the upper surface only is of full value for convection, as the heated air will tend to "pocket" against the under side. The fact that on nearly all switchboards some portion of the conductors must of necessity be flat, has been considered in fixing the figures given below, and it is also necessary to make some allowance for poor joints. If these two factors could be eliminated, the ratings given might be increased fully 10 per cent.

When carrying heavy currents through several strips in parallel the spacing between each is important, as affecting the heat-dissipating value of the inner surfaces. Experiment has shown that the strips must be spaced at least ⅝ in. apart, if both surfaces of each conductor are to give 100 per cent. efficiency as dissipators. The reduced capacities with the spacings more commonly used are shown on Table II.

TABLE III.—Maximum Permissible d.c. Load in Amps. Round Copper Rod.

Diameter. Inches.	Section sq. in.	Maximum guaranteed temperature rise. 20° C.	30° C.	40° C.
$\frac{5}{16}$ in.	·0276	58	70	80
$\frac{7}{16}$ „	·0767	124	150	175
$\frac{5}{8}$ „	·1104	164	200	230
½ „	·196	250	305	350
$\frac{5}{8}$ „	·307	350	425	490
¾ „	·442	462	565	650
1 „	·785	712	870	1,000
1⅛ „	·994	850	1,040	1,200
1⅜ „	1·485	1,146	1,400	1,600
1⅝ „	2·074	1,475	1,800	2,080
1⅞ „	2·76	1,825	2,220	2,580
2 „	3·14	2,010	2,460	2,840
2¼ „	3·97	2,400	2,830	3,400
2½ „	4·90	2,800	3,400	3,950

It will be noted that all the above figures apply to direct-current work only. On alternating-current circuits, skin effects and mutual induction between conductors must be considered. The latter is so large a factor that on 50-cycle circuits it is scarcely practicable to handle much over 1,000 or 1,500 amperes in the usual manner. The most economical scheme is to interleave the phases in the manner made familiar by furnace practice. Clearly, conditions on A.C. are so complex as to prevent the computation of useful tables, and it must be left to the designer to calculate the ratings to suit each particular lay-out.

A Useful Warning Device.—An interesting bit of "Safety First" work has been put in practice by the proprietor of a garage in Louisville, Kentucky, whose example might well be followed in other places.

Motor vehicles leaving this garage are obliged to cross the sidewalk of a busy street along which pedestrians are passing at all hours of the day and night, and as a warning a lamp has been installed in front of the exit in a large globe, on each side of which the word "Danger" is painted in large letters.

This lamp is lighted from sunset to sunrise, and in itself forms an effective cautionary signal. It is, however, supplemented by a loud-ringing gong, which is automatically operated whenever a vehicle approaches the exit door, a steel plate being so placed that it automatically closes a contact and rings the bell whenever the wheels pass over it.

Our informant writes that it is interesting to note how pedestrians passing along the sidewalk intuitively "stop, look and listen" at the instant the bell begins to ring, and wait until the automobile has crossed the sidewalk into the street. It has been suggested that local authorities would do well to enforce the installation of such a device at the entrance to every garage located on a busy thoroughfare.

Electrical System of Dust Deposition.—It was known as early as 1824 that finely divided solid particles carried in suspension in the air could be deposited on a plate by means of a brush discharge from an electrostatic machine.

In 1905-6, Prof. F. G. Cottrell, of the University of California, abandoned the static machine as a source of high-pressure direct current, and arranged to tap off the peak of the voltage wave from a high-pressure alternating-current circuit, thus securing a high-pressure unidirectional source of energy. This permitted the practical application of the process to sulphuric acid plants, powder works, cement plants, and smelters.

At Riverside, Cal., 90 tons of cement dust per day are recovered from the flues of the Riverside Portland Cement Works by this process, with a power expenditure of only 35 KW. It is reported that the waste product recovered practically pays for the cost of operating the system.—*Electrical Review and Western Electrician.*

COSTING.

By "SURPLUS."

(*Concluded from page* 383.)

The Costs Book is made up of 52 weekly sheets, 12 monthly sheets, four quarter-ending sheets, two half-year-ending sheets, one three-quarter-ending sheet, and one year-ending sheet; the rulings for the quarter, half-years, &c., are the same.

The posting should be done weekly from the Wages Analysis Book and the Stores Book to the weekly sheets in the Costs Book, and, if desired, the accounts can be further analysed to wages and material as shown. It is not necessary

WEEK ENDING.....

——	Equivalent in kilowatts connected						Units generated	Works units	Loss in distribution	Units sold	Record load	KW.	Date
	Public lighting	Private lighting	Heating apparatus, &c.	Motors	Traction	Total							
Current week ...											Max. load for week		
Corresponding week previous year...											" "		

——	Current week	Per unit sold	Corresponding week, previous year	Per unit sold
1. *Generating*—				
Coals, 1·1	Double cash		Double cash	
Oils, waste, &c., 1·2 ...				
Wages, 1·3				
Maintenance and repairs:—				
2. *Boilers*—				
Boiler No. 1, 2·1 ...				
Wages				
Material				
Boiler No. 2, 2·2 ...				
Wages				
Material				
Boiler No. 3, 2·3 ...				
Wages...				
Material				
3. *Engines*—				
3·1				
3·2				
4. *Generators*				
5. *Pumps and Pipes* ...				
6. *Buildings*...				
7. *Electrical Instruments* ...				
8. *Distributing*				
10. *Management Charges* ...				
13. *Public Lamps*				

Remarks. ——	Current week	Corresponding week previous year
Public Lighting—		
Total number of arc lamps		
Total number of incandescents		
Private Lighting—		
Total number of ledger a/c's opened		
Total number of premises vacant, &c.		
Actual number of consumers		
Applications received during week		
New consumers connected during week		
Coal—		
Quantity		
Lb. per unit generated ...		
Lb. per unit sold ...		

NOTE.—On this and the following sheets, with the exception of 1 and 2, subsidiary accounts have been omitted, as the actual subsidiary accounts opened will be governed by local conditions.

MONTH ENDING .....

——	Equivalent in kilowatts connected.						Units generated	Works units	Loss in distribution	Units sold	Record load	KW.	Date
	Public lighting	Private lighting	Heating apparatus, &c.	Motors	Traction	Total							
Current month ...											Max. load for month		
Corresp'ding month previous year ...											" "		
Totals to date, current year ...											" for year		
Totals to date, previous year ...											" "		

——	Current Month	Per unit sold	Corresponding month, previous year	Per unit sold	Totals to date, current year	Per unit sold	Totals to date, previous year	Per unit sold
1. *Generating*—								
Coals, 1·1								
Oils, waste, &c., 1·2								
Wages, 1·3								
Maintenance and repairs:								
2. *Boilers*—								
Boiler No. 1, 2·1 ...								
" " 2, 2·2 ...								
" " 3, 2·3 ...								
3. *Engines*								
4. *Generators*								
5. *Pumps and Pipes* ...								
6. *Buildings*								
7. *Electrical Instruments*								
8. *Distributing*								
9. *Rents, Rates & Taxes*								
10. *Management Charges*								
11. *Law Expenses* ...								
12. *Insurances*								
13. *Public Lamps* ...								

Remarks. ——	Current month	Corresponding month, previous year
Public Lighting—		
Total number of arc lamps		
Total number of incandescents ...		
Private Lighting—		
Total number of ledger a/c's opened		
Total number of premises vacant, &c.		
Actual number of consumers ...		
Applications rec'ved during month ...		
New consumers connected dur'g m'th		
Coal—Quantity ...		
Lb. per unit gen't'd		
Lb. per unit sold ...		
	Current year	Previous year
Totals to date:		
Coal—Quantity ...		
Lb. per unit gen't'd		
" " sold...		

to post weekly into the ledger. For the month the postings should be taken from the Wages Analysis Book summary, Stores Book summary, and Invoice Book, and posted to the ledger, and from the ledger to the monthly costs sheets, and in the same manner to the quarterly and other costs sheets.

The ledger should be of the loose-leaf kind, the index arranged in numerical order according to the number of main accounts, and the subsidiary accounts should be opened under the main headings numbered 1·1, 1·2, 1·3, as the case may be.

It will also be found to be an advantage to have an alphabetical index arranged after the numerical index for accounts other than costs accounts.

In conclusion, it may be said that with this system it is possible not only to obtain the cost of repairs and maintenance of every individual set, but also of any other machinery or apparatus if the separate costing of the same is desired.

A NEW ELECTRIC TRACTOR.

A new design of electric tractor for attachment to, and the hauling of, ordinary lorries and wagons from which the front wheels are removed, has recently been introduced by the Eldridge Manufacturing Co., of 541, Tremont Street, Boston, U.S.A.; it is designed to haul loads of 3 tons at speeds ranging from 6 to 8 miles per hour, and 5 tons at 5 to 7 miles per hour.

QUARTER ENDING.....

——	Equivalent in kilowatts connected: Public lighting	Private lighting	Heating apparatus, &c.	Motors	Traction	Total	Units generated	Works units	Loss in distribution	Units sold	Record load	kw.	Date.
Current quarter ...											Max. load for qr.		
Corresp'ding quarter previous year ...											Max. load for qr.		

——	Current quarter	Per unit sold	Corresponding quarter, previous year	Per unit sold
1. *Generating*—				
Coals, 1·1	Double cash	Double column	Double cash	Double column
Oils, waste, &c., 1·2				
Wages, 1·3				
Maintenance and repairs:—				
2. *Boilers*—				
Boiler No. 1, 2·1 ...				
„ „ 2, 2·2 ...				
„ „ 3, 2·3 ...				
3. *Engines*				
4. *Generators*				
5. *Pumps and Pipes* ...				
6. *Buildings*				
7. *Electrical Instruments*				
8. *Distributing*				
9. *Rents, Rates and Taxes*				
10. *Management Charges*...				
11. *Law Expenses* ...				
12. *Insurances*				
13. *Public Lamps* ...				

RECEIPTS.

Units sold: Corresponding quarter	Units sold: Current quarter	——	Current quarter	Per unit sold	Corresponding quarter	Per unit sold
Treble column	Treble column	Public lighting	Double cash		Double cash	
		Private lighting... ...				
		@ } M.D.				
		@ } M.D.				
		@ flat				
		Power—				
		@ heating, &c. ...				
		@ } power ...				
		@ } power ...				
		Less discounts on private lighting, heating and power				
		Other items				
		Traction—				
		@ d.				
		@ d.				
		@ d.				
		Total revenue				
		Total cost				
		Gross profit				
		Interest and sinking fund				
		Surplus				

CAPITAL EXPENDITURE.

——	Brought forward	Expended during quarter	Total to date
Lands ...			
Buildings ...			
Machinery ...			
Mains... ...			
Meters ...			
Transformers..			
Electrical Instruments			

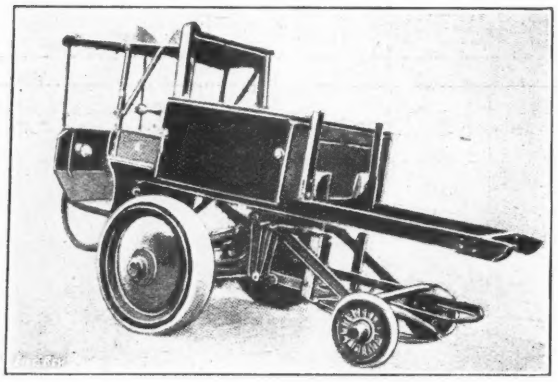
REMARKS.

——	Current quarter	Corresponding quarter, previous year
Public Lighting—		
Total number of arc lamps ...		
Total number of incandescents ...		
Private Lighting—		
Total number of ledger accounts opened		
Total number of premises vacant, &c.		
Actual number of consumers ...		
Applications received during quarter... ...		
New consumers connected during quarter		
Coal—		
Quantity... ...		
Lb. per unit generated ...		
Lb. per unit sold		

The special feature of the tractor, which consists of two Couple-Gear driving and steering wheels, each having an electric motor within the wheel, driving at a single 25-to-1 reduction in balanced action at the periphery of the wheel, is that it is equipped with a pair of auxiliary balance wheels mounted upon a special hinged carriage, which enables the tractor to be driven without the trailer. When the latter is not attached to the tractor, the frame upon which the balance wheels are mounted is swung downwards and locked in position in such a manner that the small wheels bear on

the ground and carry a proportion of the weight of the tractor. When the trailer is attached, the frame and the balance wheels are swung up from the ground, in which position they carry none of the weight of the tractor, trailer or load, these being carried entirely by the tractor and the trailer wheels.

The steering and driving wheels are 36 in. in diameter, while the balance wheels are only 15 in., and are carried on elliptic springs mounted on a special steel carriage attached to the frame. The latter is constructed of two horizontally-placed channels and two channel braces pivoted to two vertical lugs extending downwards from the frame. In one position of the pivoted members the wheels touch the ground, and in the other they are about 6 in. above it. The tractor frame, which is of channel section braced with cross-

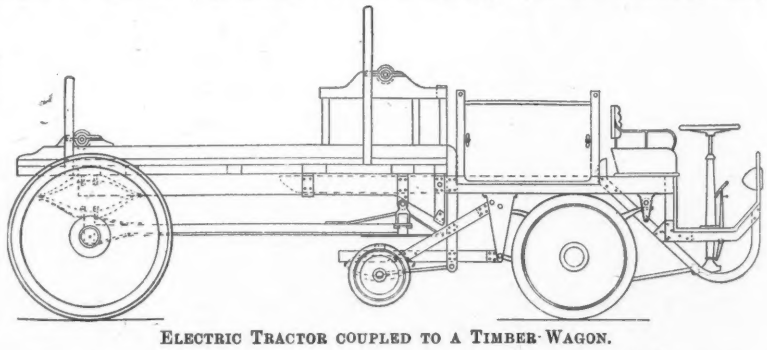


The Eldridge 3-ton Electric Tractor.

members at the front and rear ends, extends behind the battery box about 5 ft., and the two ends of this frame are bevelled upwards. Including the driver's cab, the overall length of the frame is 11 ft. 9 in. What are known as metal pockets are attached underneath the floor of the trailer body, having end openings flared both downwards and horizontally. When the bevelled ends of the tractor frame strike the lower part of the front incline of the pockets, the tractive power of the front driving wheels pushes the rear frame extension up the incline of the pockets and back into position. An ordinary hook coupling with turn-buckle is used on each side to couple the tractor and trailer firmly together. It is claimed that the pockets can be readily applied to almost any type of wagon-body. The trailer wagons retain the upper half of the original fifth wheel. During the operation of loading the ordinary front axle construction is used with the horses hauling the load, the lower half of the fifth wheel being used in conjunction with the horses to drag the wagon to and fro. After loading, the wagon is placed in some convenient spot, a jack is put underneath the perch, and the front axle is removed. The wagon is then ready to be coupled on to the tractor.

The battery is carried in a special wooden box mounted on top of the frame at the rear of the driver's cab. The box is held in position by means of four vertical angle-irons, two at the front of the box and two at the rear, these being riveted to the frame. Two batteries are furnished with each tractor, it being intended that they should be changed at the middle of each working day. The cells are readily removable by means of an overhead chain hoist and rail.

The tractor illustrated has been purchased by the Curtis and Pope Lumber Co., timber merchants, of Boston, Mass., and is at present being used in conjunction with three wagons; three more are, however, being got ready, as it has been found in practice that the tractor can readily serve six trailer wagons on short journeys to and from the railway yard, the tractor thus being kept steadily at work instead of standing idle while the wagons are being loaded and unloaded.



Electric Tractor coupled to a Timber-Wagon.

THE FARADAY SOCIETY.

Presidential Address by Sir Robert Hadfield, F.R.S.

The subject of Sir Robert Hadfield's presidential address to the Faraday Society, delivered on June 11th at the Institution of Electrical Engineers, was "Advances in the Metallurgy of Iron and Steel."

The retiring president, Dr. R. T. Glazebrook, who was in the chair, opened the proceedings by referring to the great loss the Society had sustained in the death of Sir Joseph Swan, who had been its first president, and who had continued to take the keenest interest in its welfare. A vote of condolence with Lady Swan and her family was adopted.

The address dealt more particularly with the progress that had been made in our knowledge of the remarkable properties of the numerous alloys of iron and steel with other metals, a study in which Faraday himself was one of the pioneers, for in 1822 we find him, in conjunction with Stodart, making experiments and publishing papers on the alloys of steel. Sir Robert Hadfield pointed out that the investigation of this subject has a supreme economic as well as a technical value, for the world's resources of iron ore are anything but inexhaustible, and any combination therefore which enables one to use one pound of iron where formerly two would have been necessary, is directly helping to conserve the world's natural supplies. It is possible to make a pound of alloy steel go as far as many pounds of ordinary steel.

In an interesting aside Sir Robert explained how it was that Sheffield became in the eighteenth century the centre of the special steel trade of the world, a position which she still holds. This pre-eminence would in all probability have passed to France had it not been for the mistaken idea of French metallurgists, based largely on the researches of Réaumur, that their own bar iron would make as good steel as high-class Swedish iron. The French Government would only assist the infant industry if they used home-made iron, and over this mistaken policy British common-sense and practical grasp (stimulated perhaps by the economic doctrines of Adam Smith) triumphed, with the result which everybody knows.

Coming to the main part of the address, one is struck by the fact that so little was known about the alloys of iron even as late as the eighties of last century, when Sir Robert Hadfield himself began his now famous work on manganese and silicon steels, work forming the foundation of the entire modern knowledge of alloys of iron. For example, Kohn's "Iron and Steel Manufacturing," which was issued in 1867, and remained the standard text-book for twenty years, contained not a trace of that side of metallurgy which was afterwards to develop into the now great branch of alloy steels. Again, in the year 1886 indifferent ferro-manganese, containing some 60 per cent. manganese, cost £120 per ton; to-day a ton of the high-grade 80-84 per cent. alloy can be obtained for less than £10.

There has been a tendency of recent years in considering the wonderful effects of adding to iron such metals as manganese, nickel, tungsten, and the rest, to minimise, if not to ignore altogether, the action of the carbon present. Sir Robert Hadfield belongs to the school of metallurgists once numerous, and now again growing in numbers, who regard the presence of carbon as one of the necessary conditions for obtaining alloys of the required properties, and who are satisfied with no explanation of these qualities which ignores the action of the carbon. It is well known, but often forgotten, that the cutting properties of a modern high-speed tool steel, containing usually 15 to 20 per cent. tungsten and 2 to 4 per cent. chromium, will not be attained unless there be sufficient carbon, some 0.70 per cent., present. In an example given, two alloys of the following compositions were experimented upon by the lecturer:—

	C.	Si.	S.	P.	Mn.	Cr.	W.
(1) ...	0.74	0.10	0.04	0.03	0.28	2.84	18.00
(2) ...	0.35	0.10	0.03	0.03	0.33	2.82	18.95

It will be observed that but for the carbon content these two alloys were practically identical in composition, and the heat treatment in each case was also the same. Yet the former was found by all the usual tests to be an immeasurably superior metal; indeed, the low-carbon alloy was useless for

tools. There was practically no hardenite or hardening carbon present in this steel; the carbon was almost entirely in the form of carbide.

It is facts such as these that tend, in the opinion of Sir Robert Hadfield, to throw doubt on the accuracy of the allotropic theory of iron which of late years has found so much favour in the eyes of metallographists, and which postulates the existence of an adamantine 3 form of iron. Sir Robert himself is so impressed with the importance of the part played by carbon in the various transformations of iron and its alloys that he is offering a prize of £200 (through the Iron and Steel Institute) for the best paper on the forms of carbon in iron and steel. His presidential address to the Faraday Society will have achieved its purpose if it succeeds in attracting attention once again to this most promising field of research in the great subject of iron and steel manufacture.

BRITISH BULBS FOR ELECTRIC LAMPS.

The outbreak of war has brought into prominence the dependence of many industries and undertakings upon supplies from the Continent. It has also made conspicuous—though in a much happier way—those enterprises whose products have been wholly manufactured in Great Britain.

The guiding policy of the General Electric Co., Ltd., has been to undertake the manufacture of every article, and every part of every article, in this country, and, in fact, it has acted generally as though it had foreseen and deliberately prepared for a crisis like the present.

A striking example of its strong position in this respect is afforded by the Lemington Glass Works, to which we referred in our last issue. Many makers of electric lamps in Great Britain have imported the bulbs from Germany or Austria. Ten years ago, however, the General Electric Co. took steps to secure an independent British supply of lamp bulbs, by acquiring glass works of its own. An opportunity presented itself in connection with glass works at Lemington, Newcastle-on-Tyne. In taking over these works the General Electric Co. adopted its characteristic plan of forming a subsidiary company—the Lemington Glassworks, Ltd.—in which it holds a controlling interest. At the time of purchase, the works possessed two glass houses, but the equipment has been gradually extended until the number of glass houses has reached six. This development was not achieved without overcoming many difficulties. Glass-blowing is a highly skilled trade, and the company found it necessary to train the labour it required for the special work of blowing the various bulbs required for incandescent lamps. Nevertheless, the works grew steadily, and are now giving continuous employment to about 250 workpeople.

The main purpose of the works has been, of course, to supply bulbs to the Robertson Lamp Works, Ltd. (and, later on, the Osram Lamp Works, Ltd.)—two other subsidiary undertakings of the company; but the G.E.C. does not hesitate to go to the assistance of other electric lamp makers in this country in case of need, and on several occasions when there has been a shortage of importation from the Continent there would have been a serious famine in bulbs if a supply had not been

Fig. 1.—Lemington Glass Works.

available from the Lemington Glass Works. In the present critical state of things, with importation absolutely stopped, the G.E.C. has decided to continue this broad-minded policy. So far as the capacity of the works will permit—and subject, of course, to the demands of the Government—the needs of all electric lamp makers will be met. Moreover, arrangements are being made to extend the works as rapidly as possible. In this development the G.E.C. regards the glass works in the light of a national asset, which will be utilised to the full in maintaining an industry employing many thousands of hands and of vital importance to the Admiralty and the War Office, as well as to the public generally.

A specific instance of the value of the works during the war crisis may be mentioned here. Soon after the outbreak of hostilities an urgent Government order was received by the Robertson Lamp Works, Ltd., for a special type of electric lamp. The glass for this type had previously been obtained from the Continent, but the Lemington Glass Works were

Fig. 2.—Tube Shop.

able to produce the necessary bulbs so quickly that within three days of the receipt of the order complete samples of the lamps were in the hands of the Government department concerned. These samples were approved, and the order to manufacture in quantities was at once put in hand.

Even under normal conditions, the execution of such an order would have occupied six weeks, if Continental sources had been chosen.

We reproduce herewith some photographs of the Lemington Glass Works which were taken at the end of last month. The works are open to inspection by anyone who is sufficiently interested to write for permission to visit them.

The cessation of the foreign importation of glass offers an opportunity for the employment of from four to five times the number of people at present engaged in this section of the British glass industry.

LEGAL.

Electric Light Arrears.

At North London Police Court, on Friday, Mr. A. M. Bramall, solicitor, applied for summonses against Islington ratepayers due on electric lighting, and referred to the Act of Parliament, passed in August last, which came into operation forthwith. It was the Courts Emergency Powers Act, which provided that no execution for any debt incurred either before or after the passing of the Act should be issued without previous application to, and sanction of, the Court.

Mr. Hedderwick: I have not yet read the Act, but is any useful purpose served in issuing process which cannot be acted upon?

Mr. Bramall: It will be for you to decide, after hearing the whole circumstances, whether execution should issue. There may be cases where the provisions of this Act will afford a great relief to debtors, and rightly so, but there may be others where people can, but will not, pay; and then it will be for you to permit execution to issue.

Mr. Hedderwick: You may take your summonses; meanwhile I will look up the Act of Parliament.

Stealing Magnetos.

Before Judge Atherley Jones at the Central Criminal Court on Tuesday, Frank Edward Pullen, 39, Alfred John White, 40, Thomas Alfred Williams, 35, and Frederick George Cox, 47, were charged with stealing and receiving a number of magnetos and carburetters, valued at £171 17s., on February 1st last, the property of the Associated Equipment Co., Ltd. Pullen pleaded guilty, but the other defendants denied the charges.

The jury acquitted Cox, but found White and Williams "Guilty." Pullen was sentenced to four months' imprisonment in the second division, and Williams and White each to six months in the second division. Cox was discharged.

The Disputed Carbons.

Before the Common Serjeant (Sir F. Bosanquet, K.C.) at the Central Criminal Court, on Friday, George Kirtland, 28, electrician, Thomas Alfred Thornton, 20, secretary, and Arthur Marston Billington, 50, company director, surrendered to their bail to answer a charge of breaking and entering the premises of the Foster Engineering Co., at Merton Road, Wimbledon, on August 15th last. They all pleaded not guilty.

Mr. George Elliott, K.C., and Mr. Walter Frampton appeared for the prosecution, while the defendants were represented by Sir Frederick Low, K.C., and Mr. H. Dobb.

Mr. Elliott said that the premises of the prosecutors were entered on August 15th, and some 213,000 carbons were removed. The defendants claimed that they were entitled to the carbons to use in an arc lamp of which they were the patentees, and which had been made by a German firm. The premises of the prosecutors were broken into under a "claim of right." Counsel said he had carefully considered the case, and was satisfied that it would be impossible to ask the Court and jury to find that the defendants had any felonious intent. What they did they did honestly in the belief that they had a claim of right to the possession of the articles. It was not necessary at the present time to go further into the matters, which were forming the subject of proceedings in the Chancery and King's Bench Divisions of the High Court. Counsel added that it would be quite hopeless and impossible, and also unjust to the defendants, for the prosecution to be proceeded with. After reading the papers in the case, he was surprised that the local justices committed the defendants for trial. Under the circumstances, he proposed to offer no evidence against the defendants. The goods were taken in the middle of the night, and, therefore, the prosecution thought that, *primâ facie*, they had been stolen. The matter was put in the hands of the police, who at once found that the goods had been removed through the instrumentality of the defendants. The prosecution then had to go on in the ordinary way.

Sir Frederick Low said that the defendants were men of the highest respectability. It was important that no one should think that there was the slightest justification for the criminal proceedings. He was amazed that the justices had ever committed the defendants.

The Common Serjeant said it was quite clear that there was some civil dispute between the parties. As the property was removed the prosecutors very naturally put the matter in the hands of the police. It was clear that the matter was really a civil dispute between the parties, and was not a case for a criminal court. It might be unfortunate that the magistrates thought fit to commit the defendants, but they left the Court as if no one had ever thought fit to prosecute them.

At the direction of the Judge, the jury returned a verdict of not guilty against the defendants, and they were discharged.

FOREIGN AND COLONIAL TARIFFS ON ELECTRICAL GOODS.

The Customs Department of the Commonwealth of Australia announce the following decisions in respect to import duties under the United Kingdom preferential tariff :—

Multipliers, used with electrical measuring instruments	Free
Exciters for electric generators :	
Imported separately	20% ad val.
Imported with generator, according to capacity of generator	20 or 12½% ad val.
Locking bolts	15% ad val.
Galvanised steel channels	12½% ad val.

Magneto Manufacture in Great Britain.—The name of another British firm—that of Messrs. Morris & Lister, of Lockhurst Lane, Coventry—has now to be added to the list of those who are commencing to cater for the demand for ignition magnetos for British motor-cars. At present only magnetos for single-cylinder engines are being made, but as soon as the necessary tools are ready, a four-cylinder model, and possibly one or two other types will be introduced. The design of the machines is stated to follow closely the lines of the Bosch.

New Electric Vehicle.—A new electric motor delivery van, of British construction, has lately been put on the market by Opel Cars, Ltd., of Halkin Street, Grosvenor Place, London, W. The motor is carried towards the rear of the frame, its power being transmitted by chain to a geared-down countershaft with which the differential gear is embodied, and thence by side chains to the rear road wheels. The controller is adapted to give four forward and two reverse speeds.

Patent Restoration.—An order has been made for the restoration of patent No. 1,751 of 1909 for "Improvements in calculating machines," granted to Mr. W. C. Cordingley.

NEW PATENTS APPLIED FOR, 1914.

(NOT YET PUBLISHED).

Compiled expressly for this journal by Messrs. W. P. Thompson & Co., Electrical Patent Agents, 285, High Holborn, London, W.C., and at Liverpool and Bradford, to whom all inquiries should be addressed.

19,254. "Devices for separating magnetic materials from materials in which they may be present as impurities or foreign matter." H. H. Thompson and A. E. Davies. August 31st.

19,255. "Electric fluid-heaters." W. P. Perry. August 31st.

19,257. "Electric-conduit fitting." T. Longmore and J. E. Masefield. August 31st.

19,261. "Apparatus for use in transmitting telegraphic messages." G. S. Cheshire. August 31st.

19,290. "Solenoid switches." T. G. Nyborg. September 1st.

19,300. "Electrical railway signalling." J. Gardner. September 1st.

19,312. "Anode for electric osmotic processes." G. B. Schwerin. September 1st. (Complete.)

19,313. "Magnetic separation of ores." G. B. Schwerin. September 1st. (Complete.)

19,316. "Aerial strainers or the like and manufacture thereof." T. Sloper. September 1st.

19,319. "Electric connexions and the like." S. F. Tyler and W. J. E. Beere. September 1st.

19,322. "Translating device." J. W. Mackenzie. September 1st. (International Electric Tool Co., United States.) (Complete.)

19,324. "Process for the electro-deposition of zinc." S. O. Cowper-Coles. September 1st.

19,325. "Process for the removal of tin from tinned iron and the like." S. O. Cowper-Coles. September 1st.

19,339. "Unspillable gas outlet for miners' lamp and other accumulators. J. H. Rothwell and J. Roberts (trading as J. H. Rothwell & Co.). September 2nd.

19,344. "Electrical connections." H. Lucas and W. H. Edwards. September 2nd.

19,394. "Manufacture of depolarizing material for use in primary galvanic batteries." T. W. F. Clark. September 3rd.

19,425. "Automatic electro-dynamic brake system for feed-reels and the like." H. V. James. September 4th.

19,433. "Means for producing oscillating currents of high frequency." A. H. Cohen. September 4th. (Complete.)

19,441. "Electric staff-exchangers." A. Douglas and H. H. Hodgson. September 4th. (Convention date, October 28th, 1913, Australia.) (Complete.)

19,443. "Electric lighting systems." G. J. Duckett. September 4th.

19,446. "Protective devices." British Thomson-Houston Co., Ltd. September 4th. (General Electric Co., United States.)

19,480. "Electrical-operated slide-projecting machine for advertising and other purposes." I. G. Butler. September 5th.

19,483. "Electric telegraphy." W. Judd and Eastern Telegraph Co., Ltd. September 5th.

19,484. "Device for supporting and insulating conductors." P. Good and A. E. Woodhouse. September 5th. (Complete.)

19,492. "Internal-combustion engine with electrically-driven charging pump." Allgemeine Elektricitats Ges. September 5th. (Convention date, September 6th, 1913, Germany.) (Complete.)

19,494. "Internal-combustion engines particularly adapted for use in motor vehicles." P. M. Justice. September 5th. (North-East Electric Co., United States.) (Complete.)

PUBLISHED SPECIFICATIONS.

Copies of any of the Specifications in the following list may be obtained of Messrs. W. P. Thompson & Co., 285, High Holborn, W.C., and at Liverpool and Bradford; price, post free, 9d. (in stamps).

1913.

14,125. Plastic Material. A. Chanard. June 18th. (July 6th, 1912.)

15,733. Electrically-operated Piano Players. C. Youldon & C. A. Youldon. July 8th. (January 8th, 1914.)

16,208. Controllers for Electrical Apparatus. A. Mond. (Maschinenfabrik Oerlikon.) July 14th.

18,448. Incandescent Electric Lamps. British Thomson-Houston Co. (General Electric Co.) August 13th.

18,500. Liquid Resistances. Akt. Ges. Brown, Boveri, et Cie. August 14th. (January 11th, 1913. Addition to 18,000/13.)

18,609. Lockout Telephones for Party Lines. A. W. Mathys (C. R. Miller). August 15th.

18,727. Spark Plugs. M. G. Kopf. August 18th. (November 8th, 1912.)

18,983. Burglar Alarms. I. Shenker. August 21st.

19,141. Switch-actuating Apparatus of Electrically-driven Machines. A. Prior, and Butterworth & Dickinson, Ltd. August 23rd.

19,305. Telephone Exchange Systems. E. R. Corwin. August 26th.

19,443. Starting and Controlling Mechanism for Electric Motors. British Thomson-Houston Co. and R. D. Given. August 27th.

20,122. Manufacture of Drawn Wires from Tungsten and the like Metals. C. Gladitz. September 5th.

21,050. Electric Locks for Lift Gates and Doors. C. G. Major, P. H. Stevens & Smith, Major & Stevens, Ltd. September 17th.

21,070. Contact Surfaces of Electrical Coupling Devices. G. St. J. Day. September 18th.

21,779. Apparatus for producing Ozone. British Thomson-Houston Co. (General Electric Co.) September 26th.

25,363. Electrical Conduit Systems. M. Railing and T. Taylor. November 6th.

25,790. Insulating Covering for Overhead Wires. G. H. Vaughan. November 11th.

26,704. Means for supporting Resistance-wires and the like. Credenda Conduits Co. and V. Summerhayes. November 20th.

1914.

4,211.—Means for Regulating the Reversal of Electric Motors, particularly applicable for use in connection with Elevators. Otis Elevator Co. (Otis Elevator Co.) February 18th.

8,178. Automatic Starters for Dynamo-electric Machines. F. Newton & Newton Brothers. March 31st.

10,523. Mercury Vapour Lamps. W. A. A. Steinmann. April 28th. (April 29th, 1913.)

11,612. Wall Plugs or Sockets. I. B. Malaby. May 11th.

16,234. Automatic Selector-switches for Telephone Exchange Systems. C. A. W. Hultman. July 7th. (July 11th, 1913.)